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Ishizawa et al.

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(45) **Date of Patent: Jun. 4, 2013**

(54) **LIQUID ACCOMMODATING CONTAINER, TANK UNIT, AND LIQUID EJECTING SYSTEM**

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(73) Assignee: **Seiko Epson Corporation**, Tokyo (JP)

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(30) **Foreign Application Priority Data**

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B41J 2/175 (2006.01)

(52) **U.S. Cl.**
USPC **347/85**; 347/86; 347/84; 347/87

(58) **Field of Classification Search**
CPC B41J 2/175
USPC 347/85
See application file for complete search history.

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Primary Examiner — Matthew Luu
Assistant Examiner — Lily Kemathe
(74) *Attorney, Agent, or Firm* — Kilpatrick Townsend & Stockton LLP

(57) **ABSTRACT**

A liquid accommodating container in which in a use position, a port opened to the air is provided at a position that is closer to an air chamber uppermost surface and is included in a first corner portion, an air-side opening is provided at a position that is closer to an air chamber lowermost surface and is included in a second corner portion which is at a diagonal position to the first corner portion, and a liquid-side opening is provided at a position satisfying the following conditions (a) and (b), (a) a position closer to a liquid chamber lowermost surface with respect to the vertical direction in the use position and (b) a position which is included in the second corner portion that is at a position equivalent to a diagonal position to the first corner portion.

15 Claims, 18 Drawing Sheets

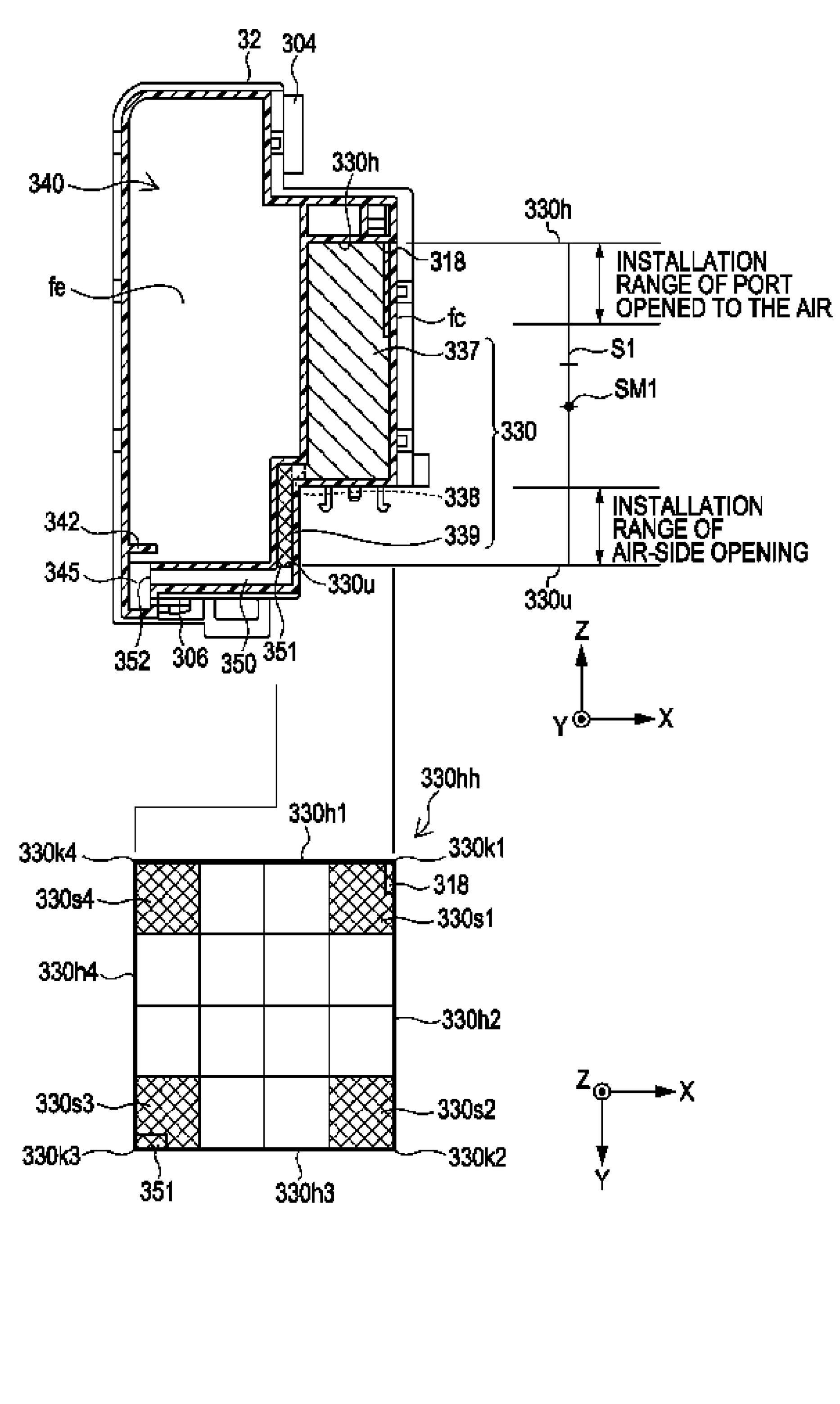

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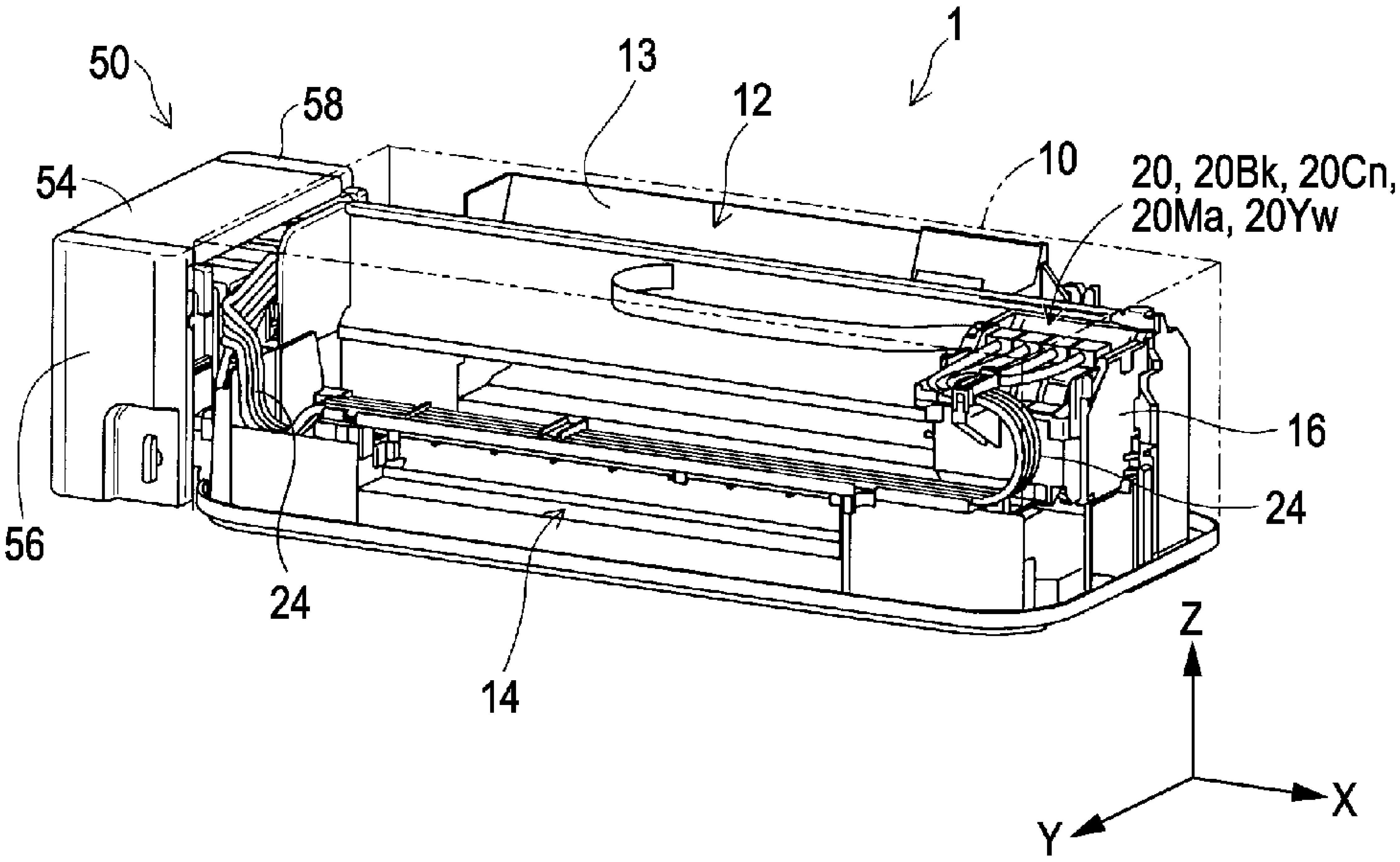
FIG. 1A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58
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20, 20Bk, 20Cn,
20Ma, 20Yw
16
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14
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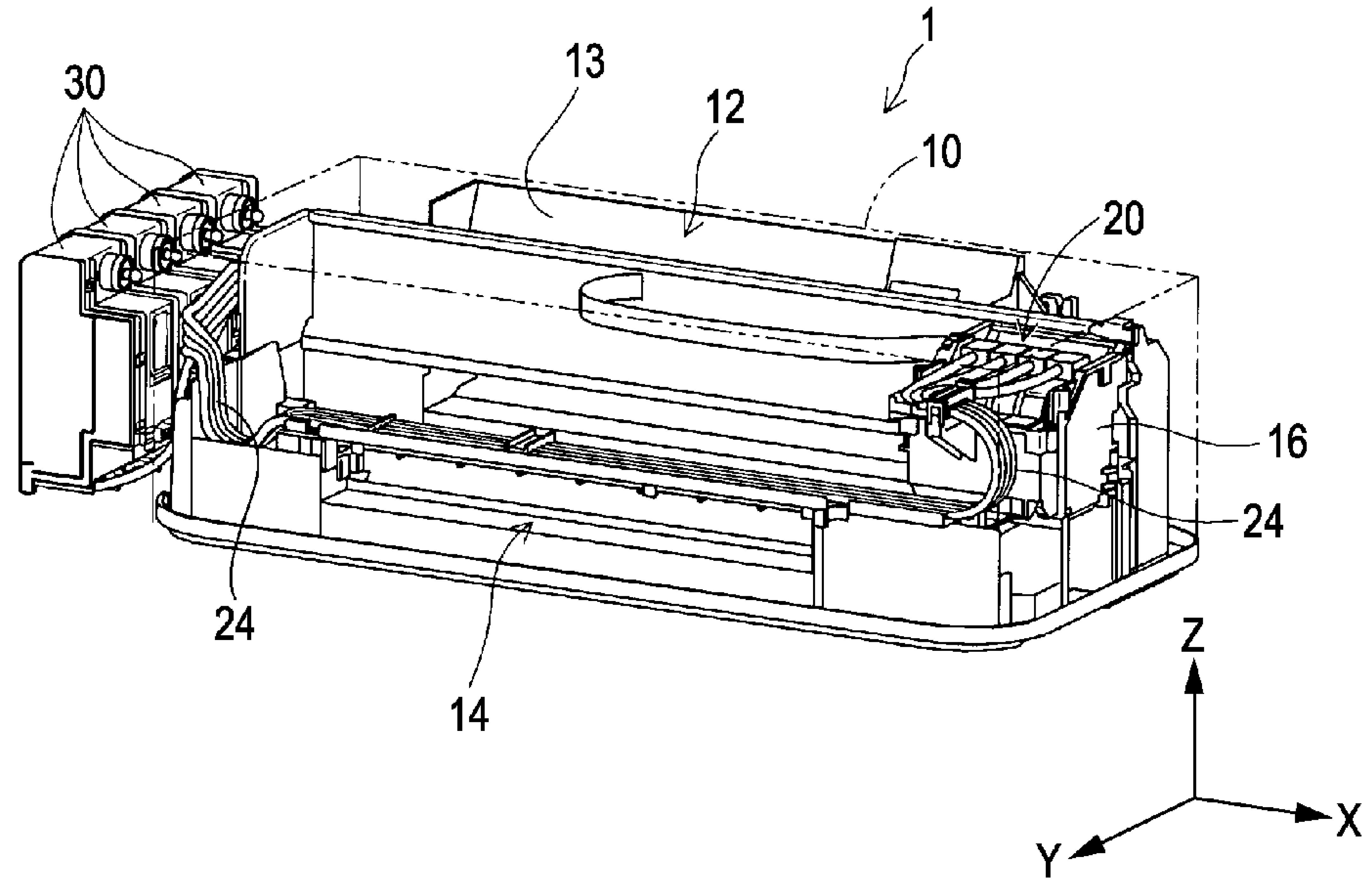
X
Y

FIG. 1B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Y

FIG. 2

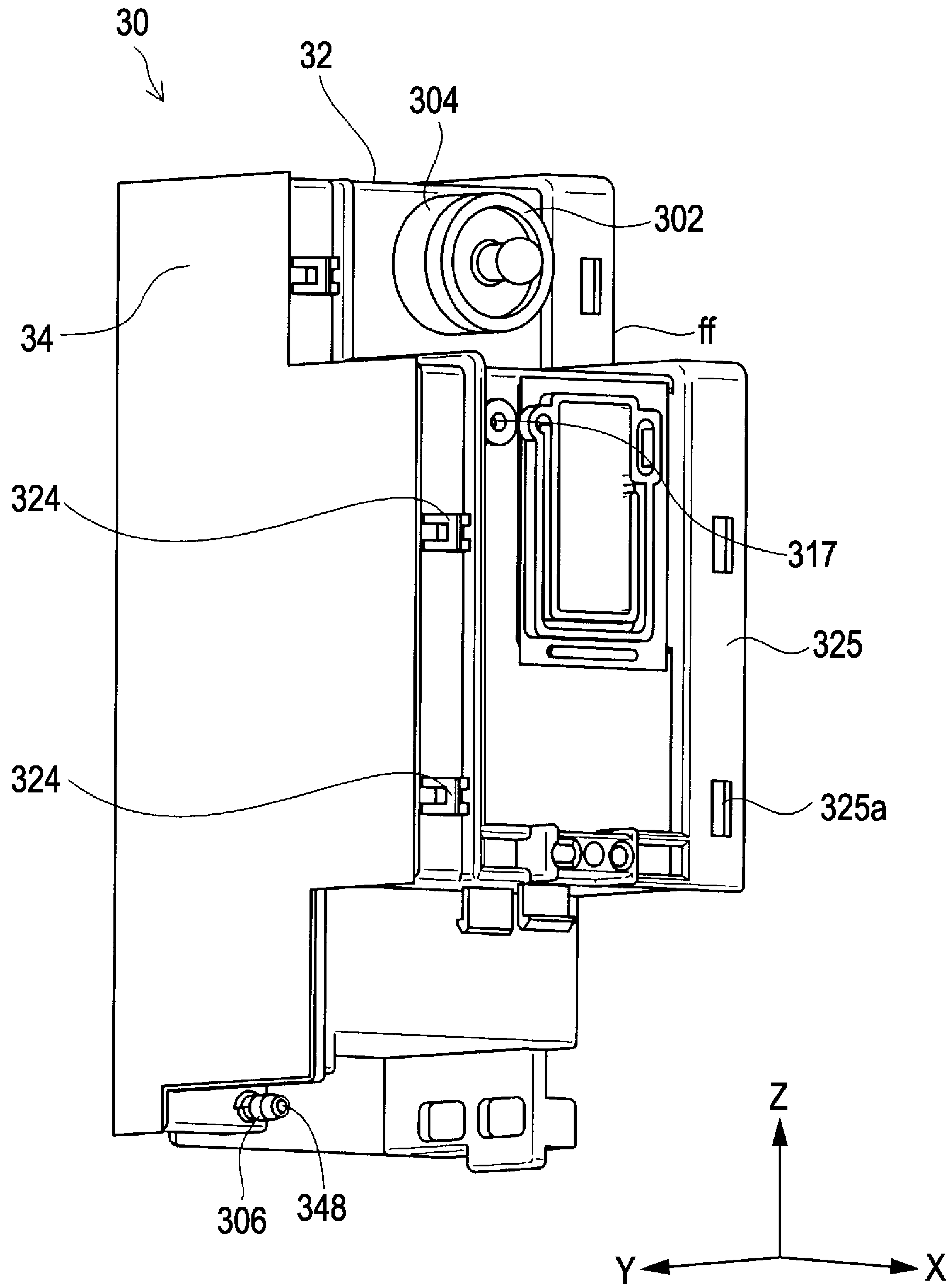


FIG. 3

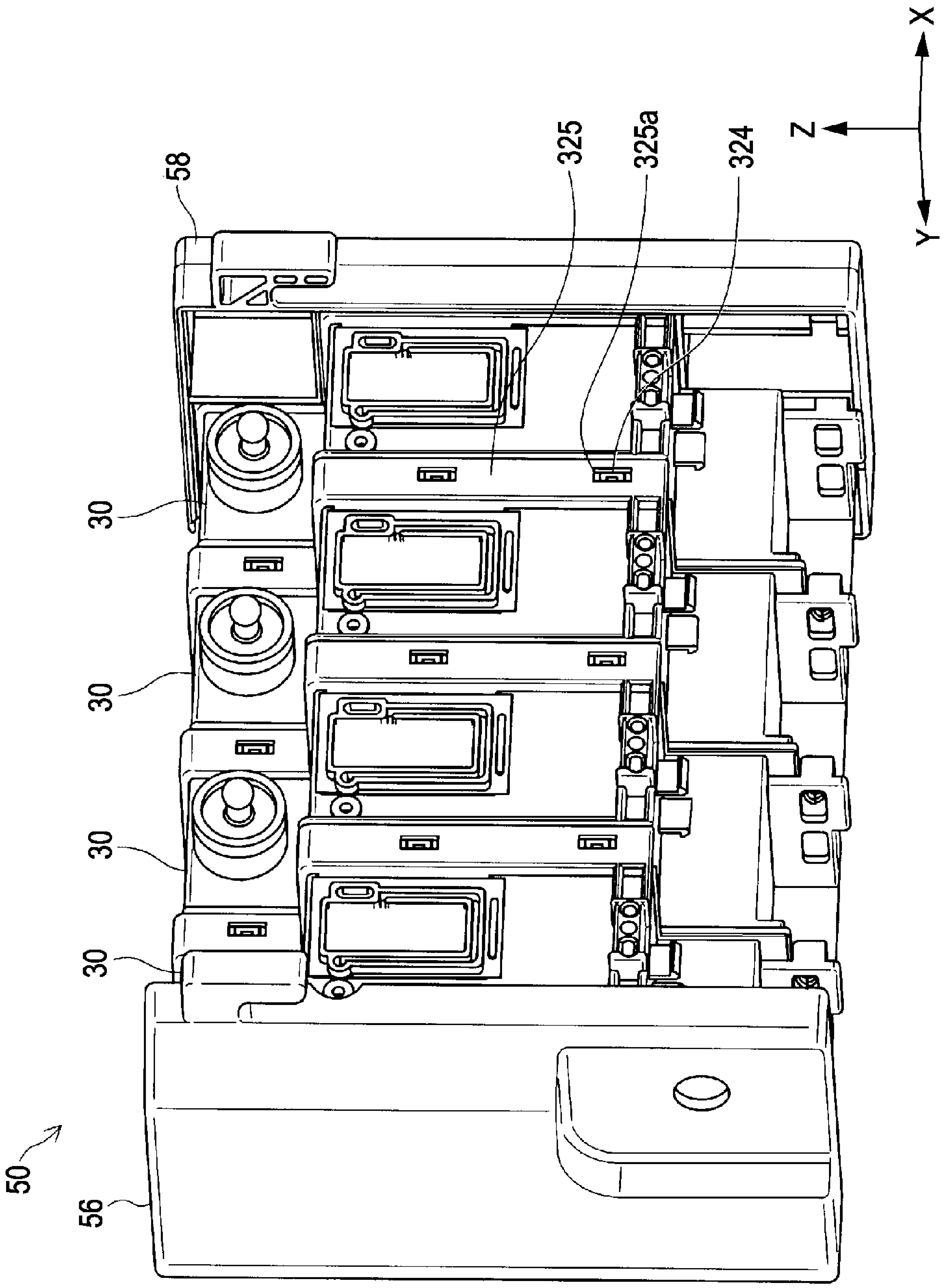
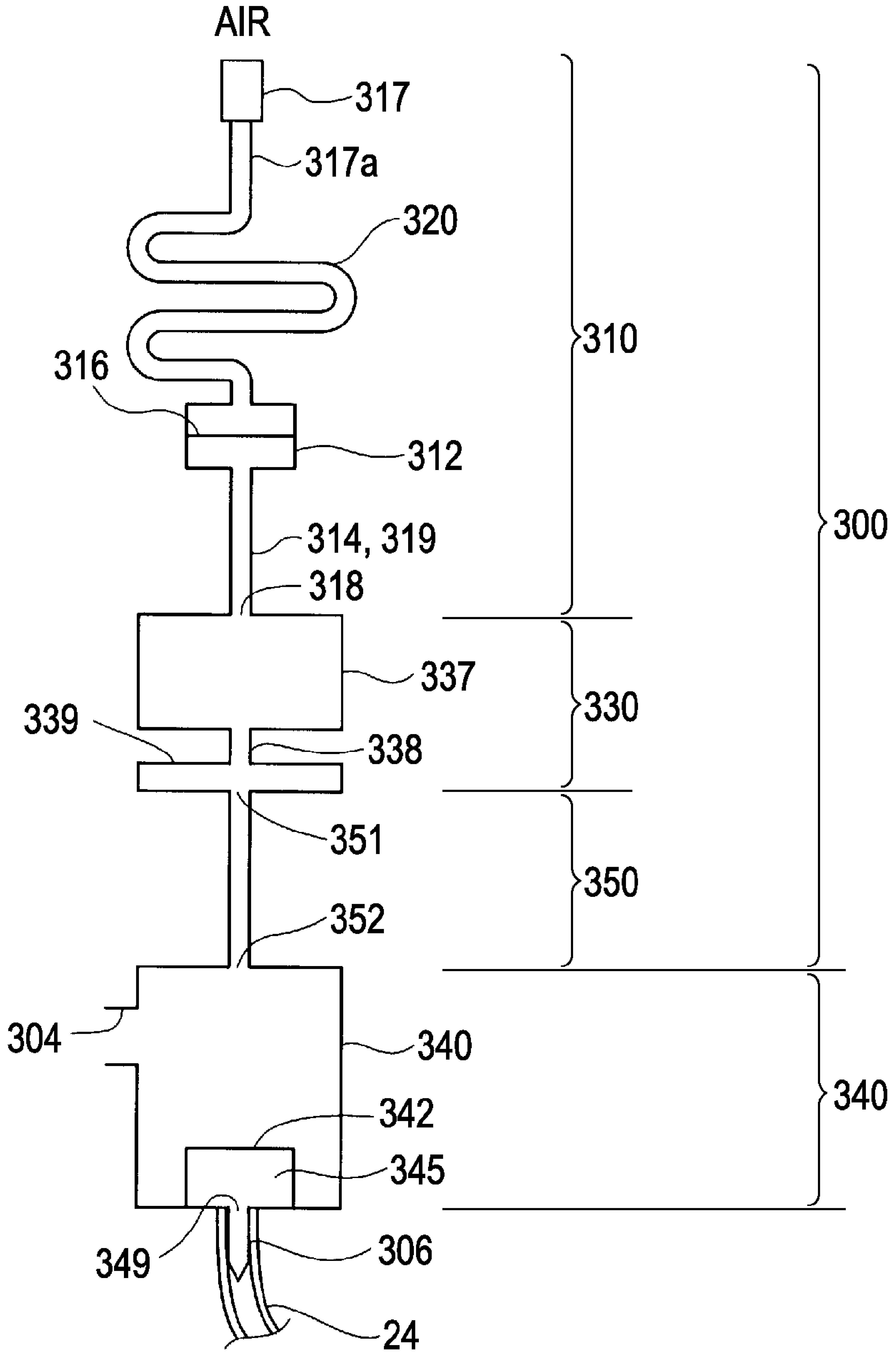


FIG. 4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317a
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312
314, 319
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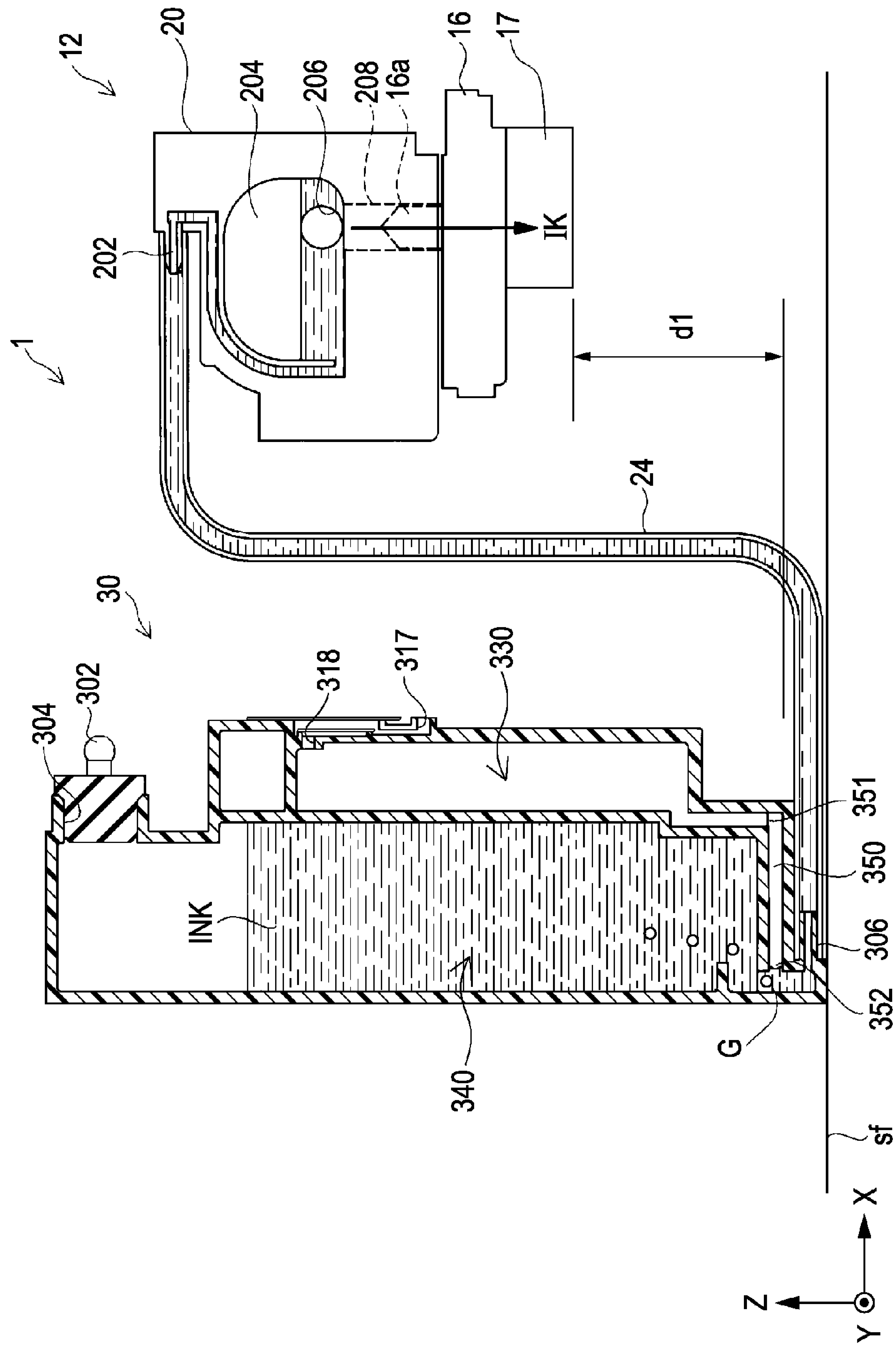
349
306
24

FIG. 5



1
12
20
204
206
208
16a
16
17
202
IK
d1
24
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318
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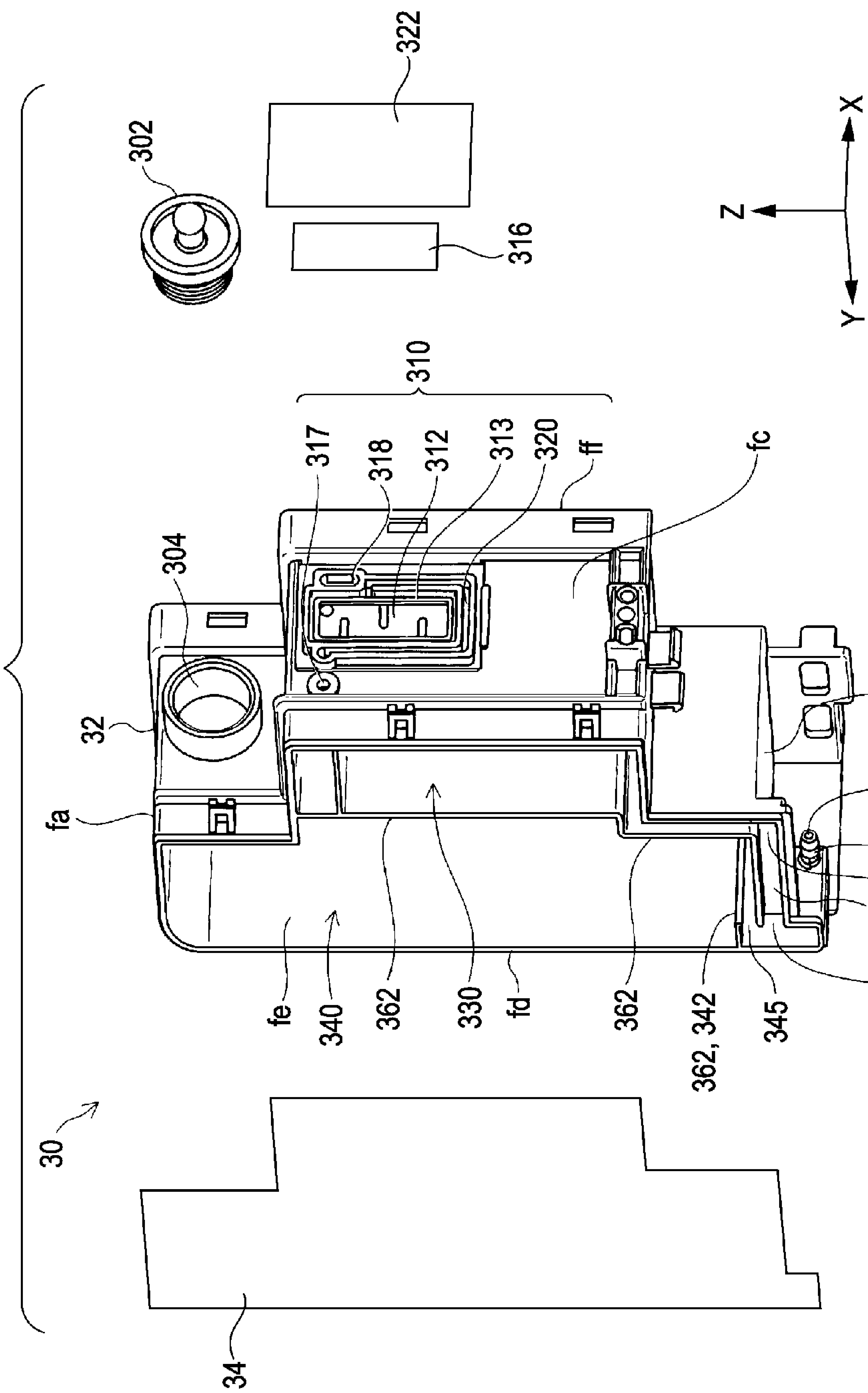
INK
340
G
sf
X
Z
Y

FIG. 6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fd
330
362
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fe
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34

FIG. 7

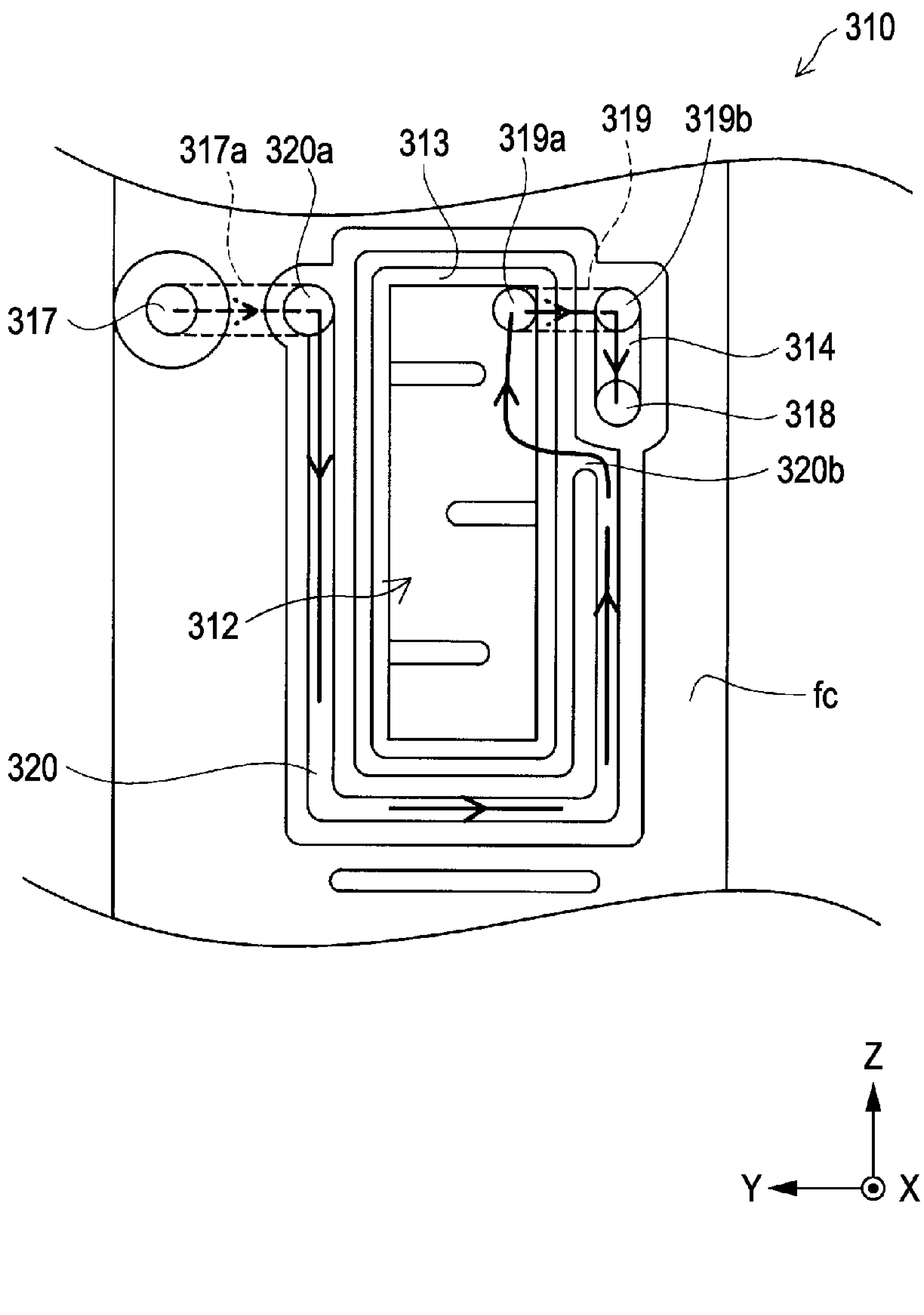
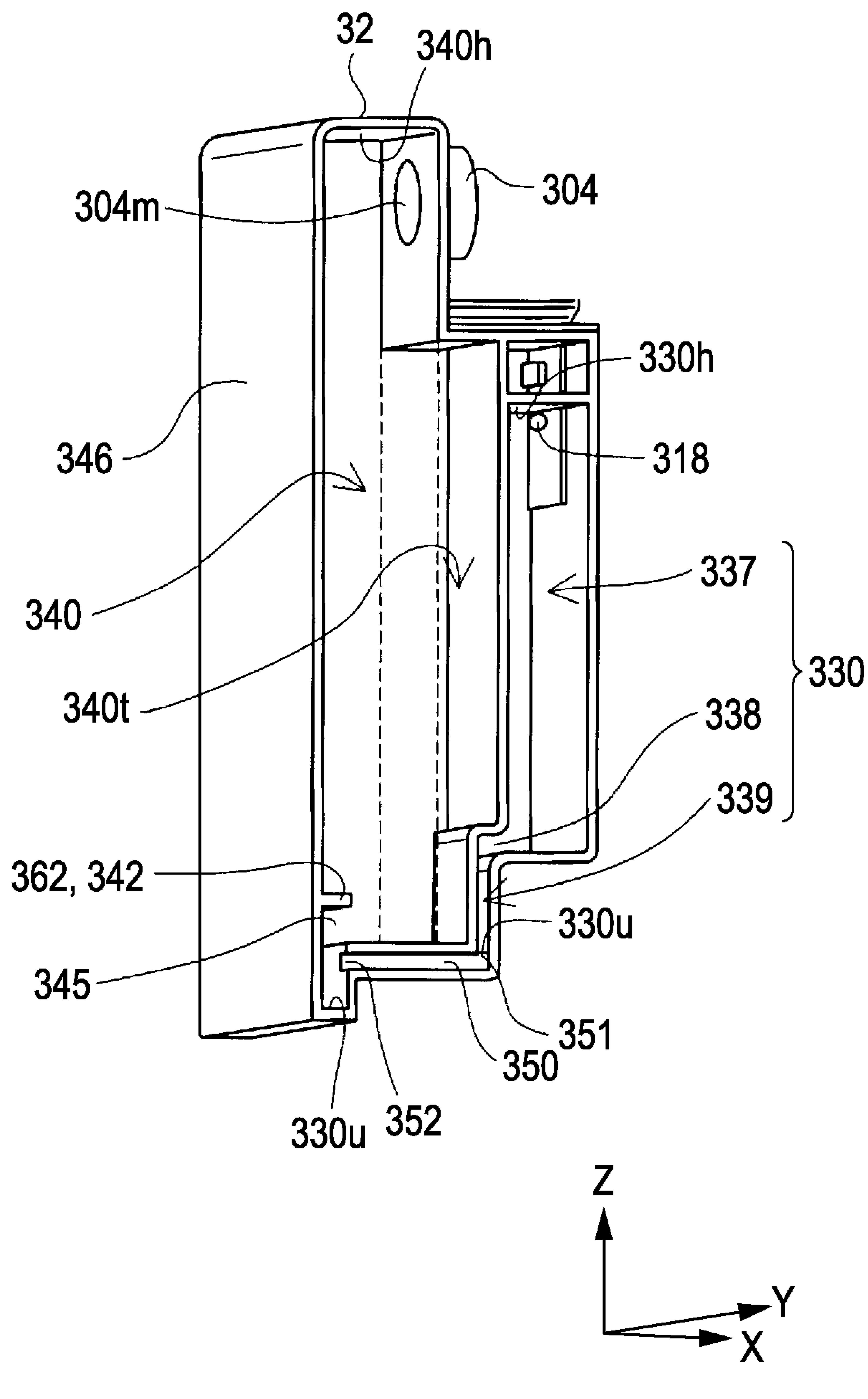


FIG. 8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330u
352
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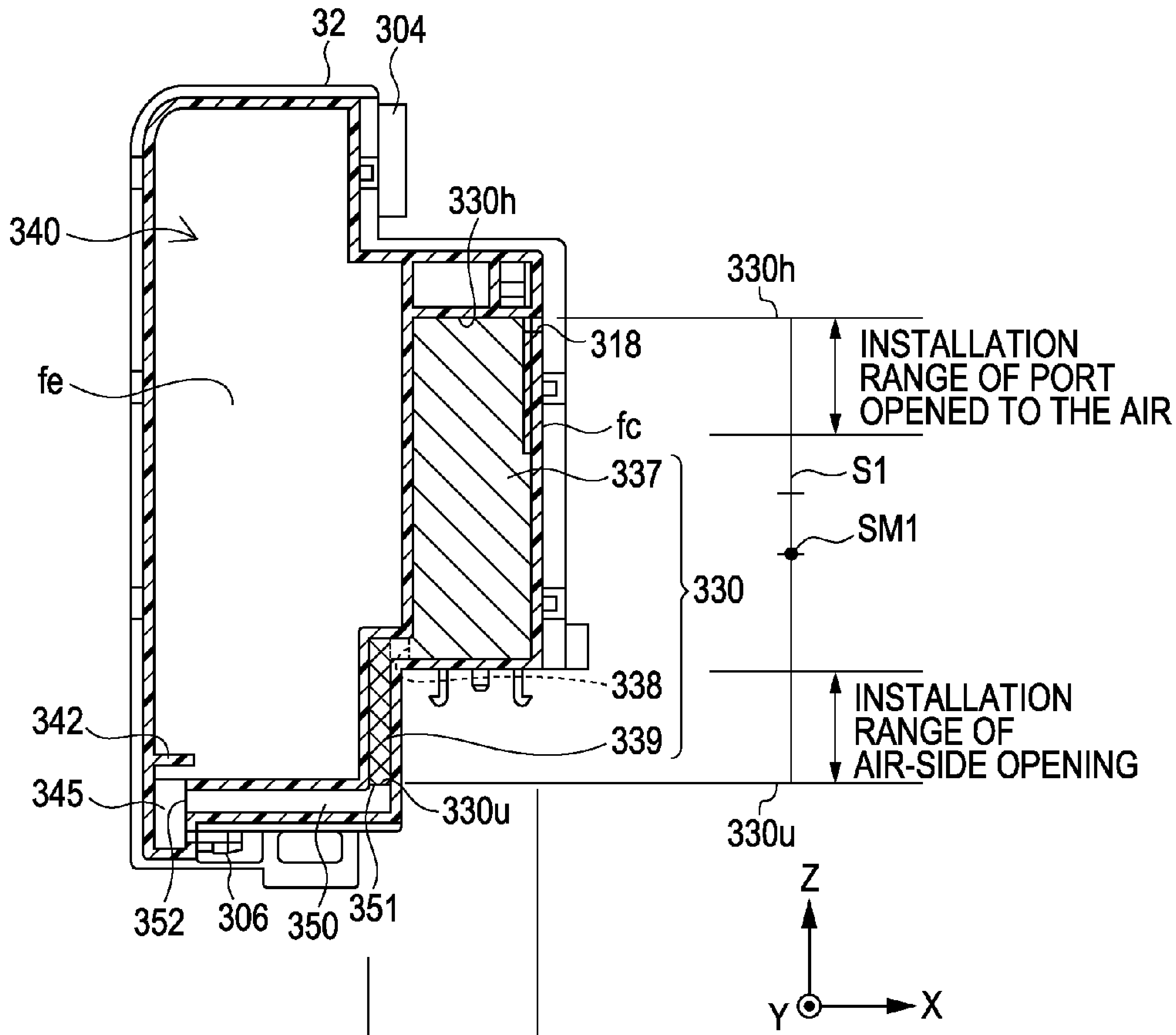
FIG. 9A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340
330h
INSTALLATION RANGE OF PORT OPENED TO THE AIR
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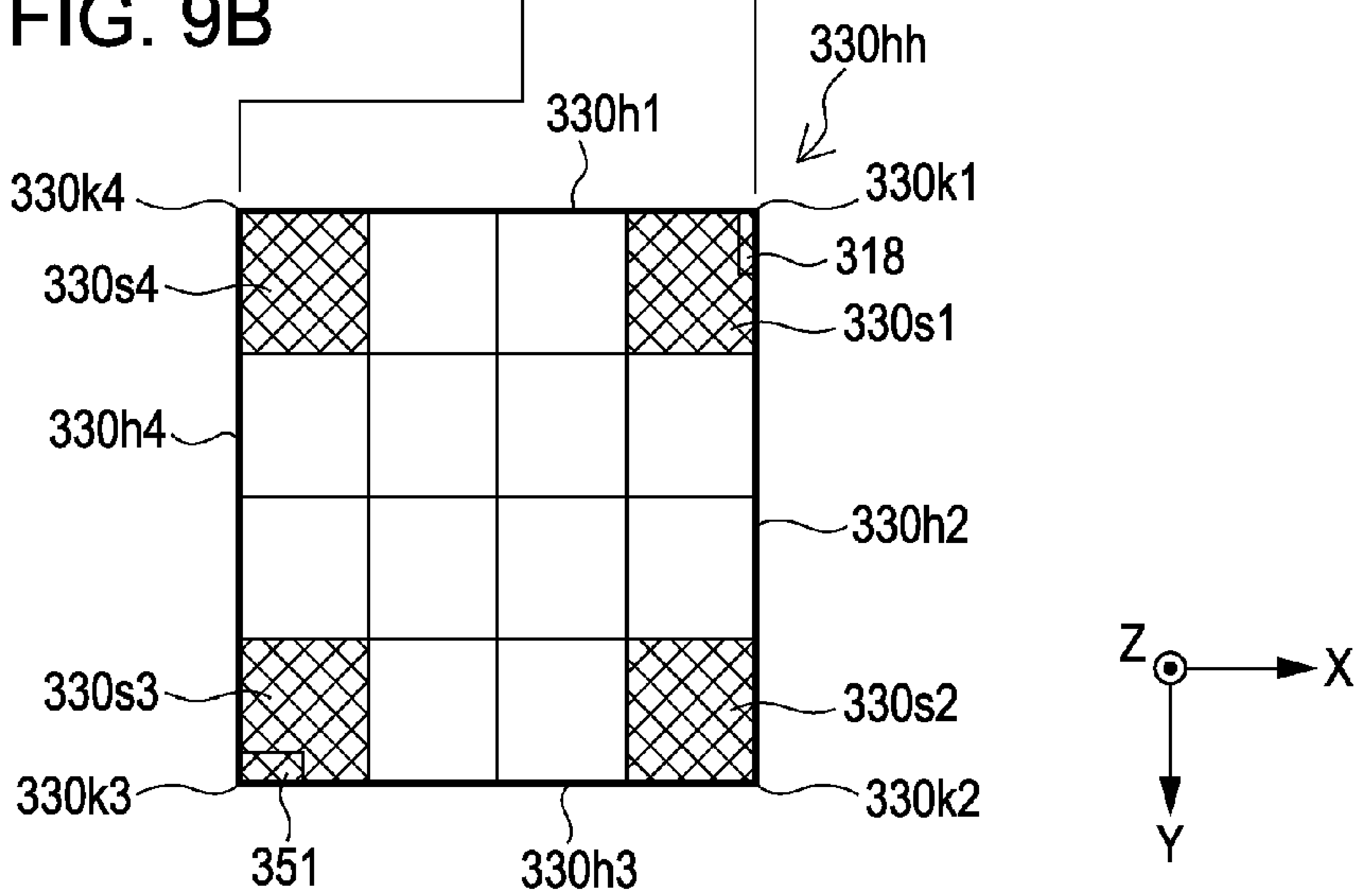
fe
fc
337
S1
SM1
330
338
INSTALLATION RANGE OF AIR-SIDE OPENING
342
339
345
330u
330u
352
306
350
351
Z
Y
X

FIG. 9B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330k1
330s4
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330h2
330s3
330s2
330k3
330k2
351
330h3
Z
X
Y

FIG. 10A

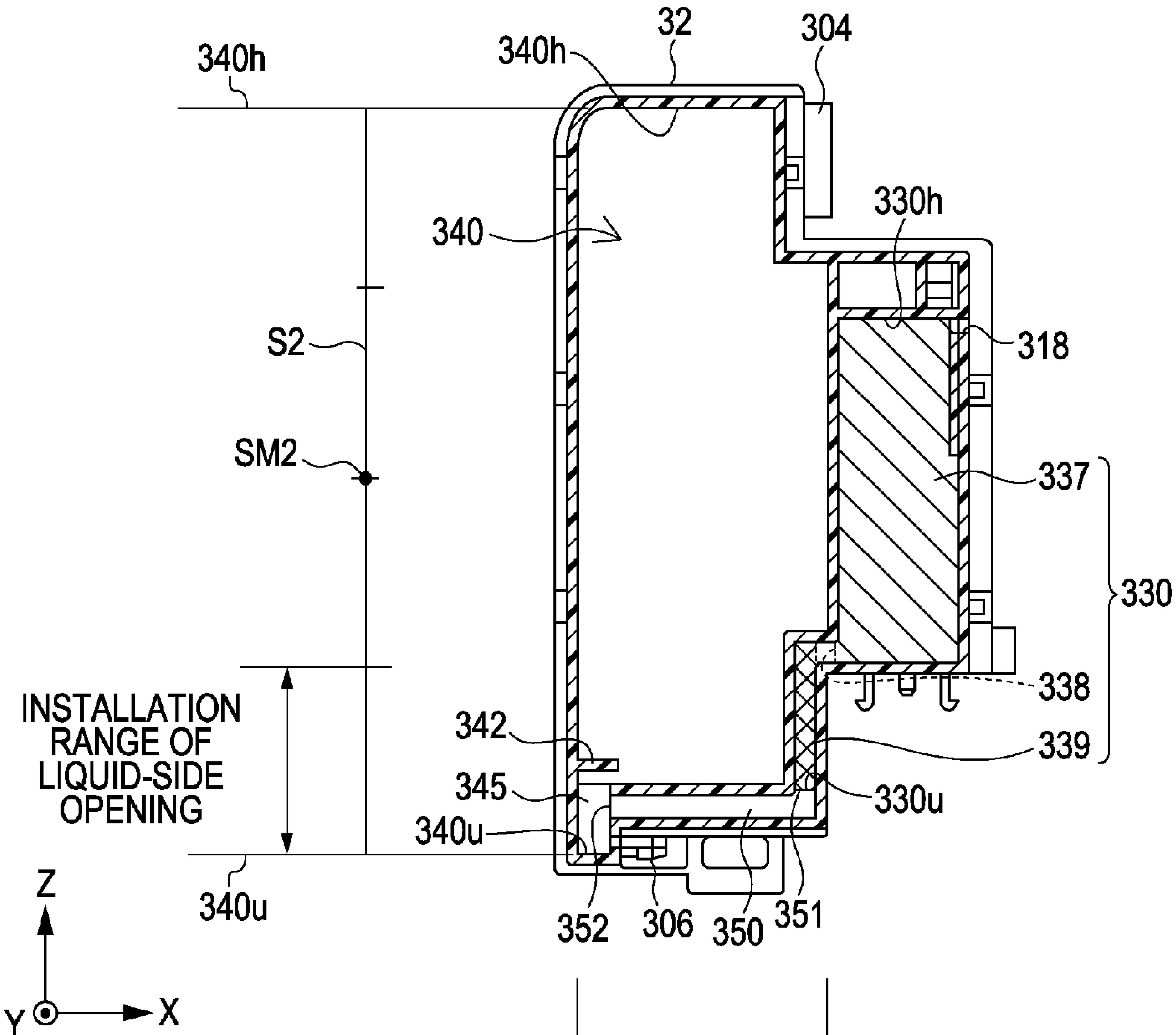

FIG. 10B

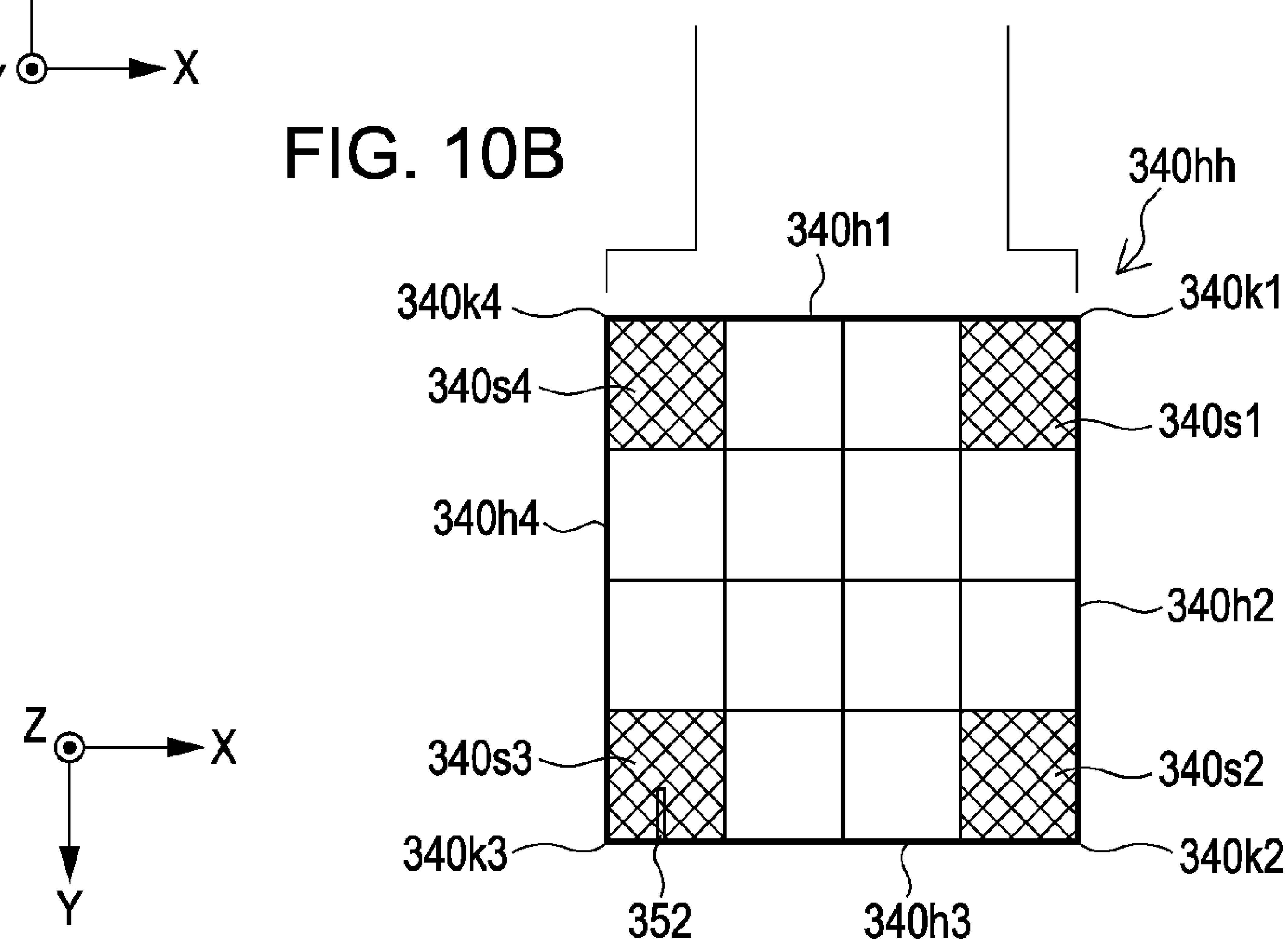

FIG. 11A
USE POSITION

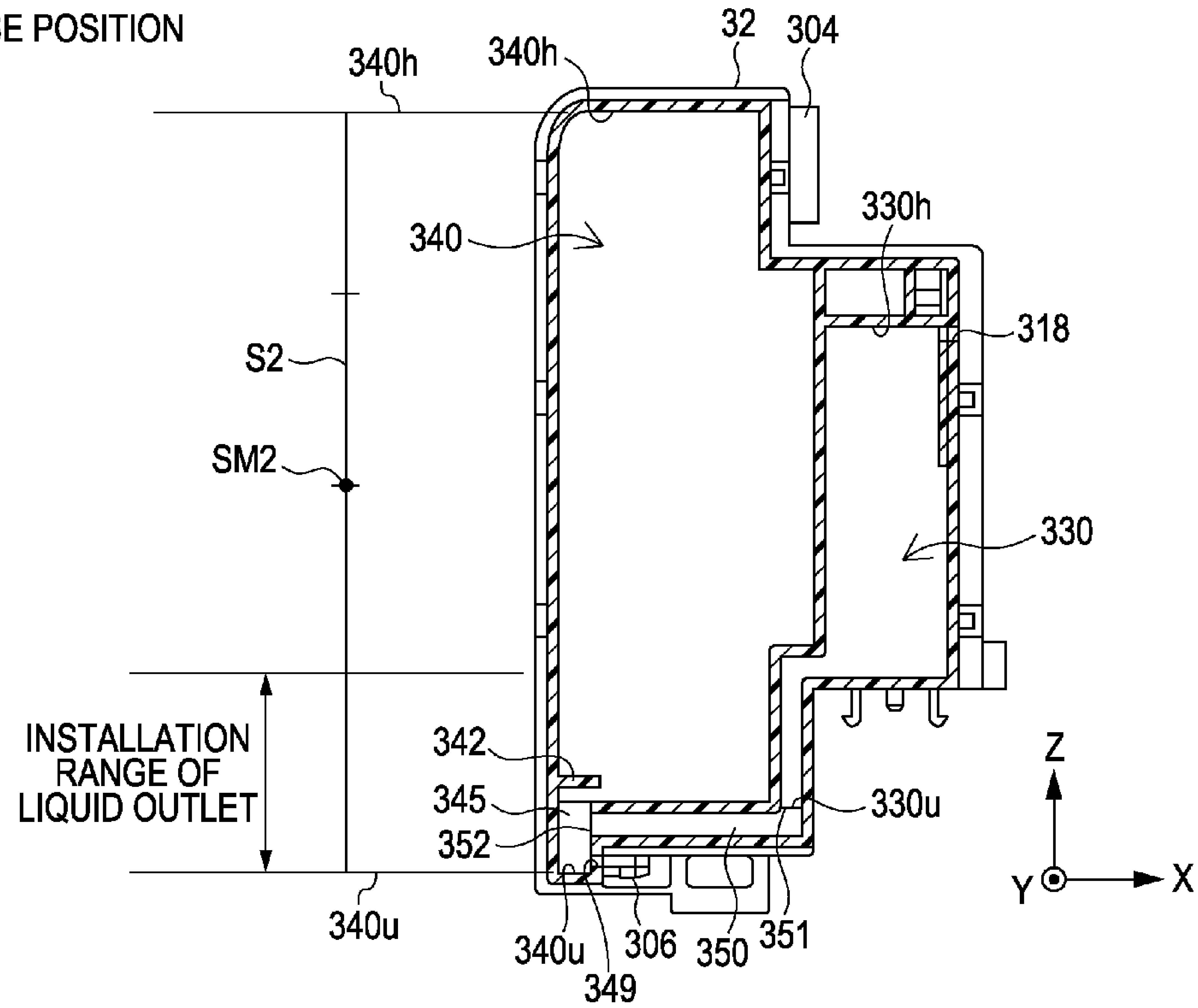

FIG. 11B
INJECTION POSITION

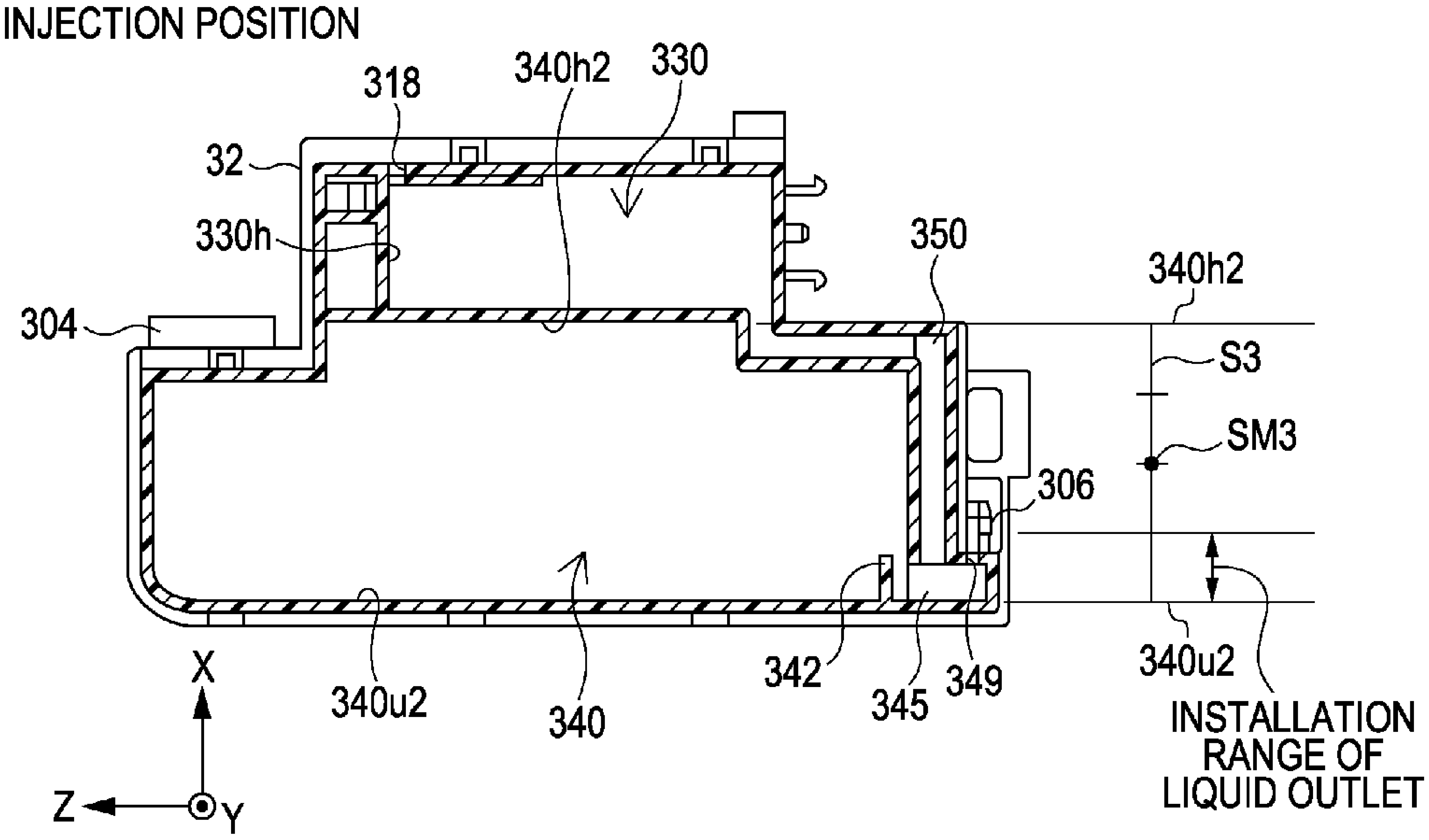

FIG. 12

REMAINING AMOUNT OF INK: SMALL

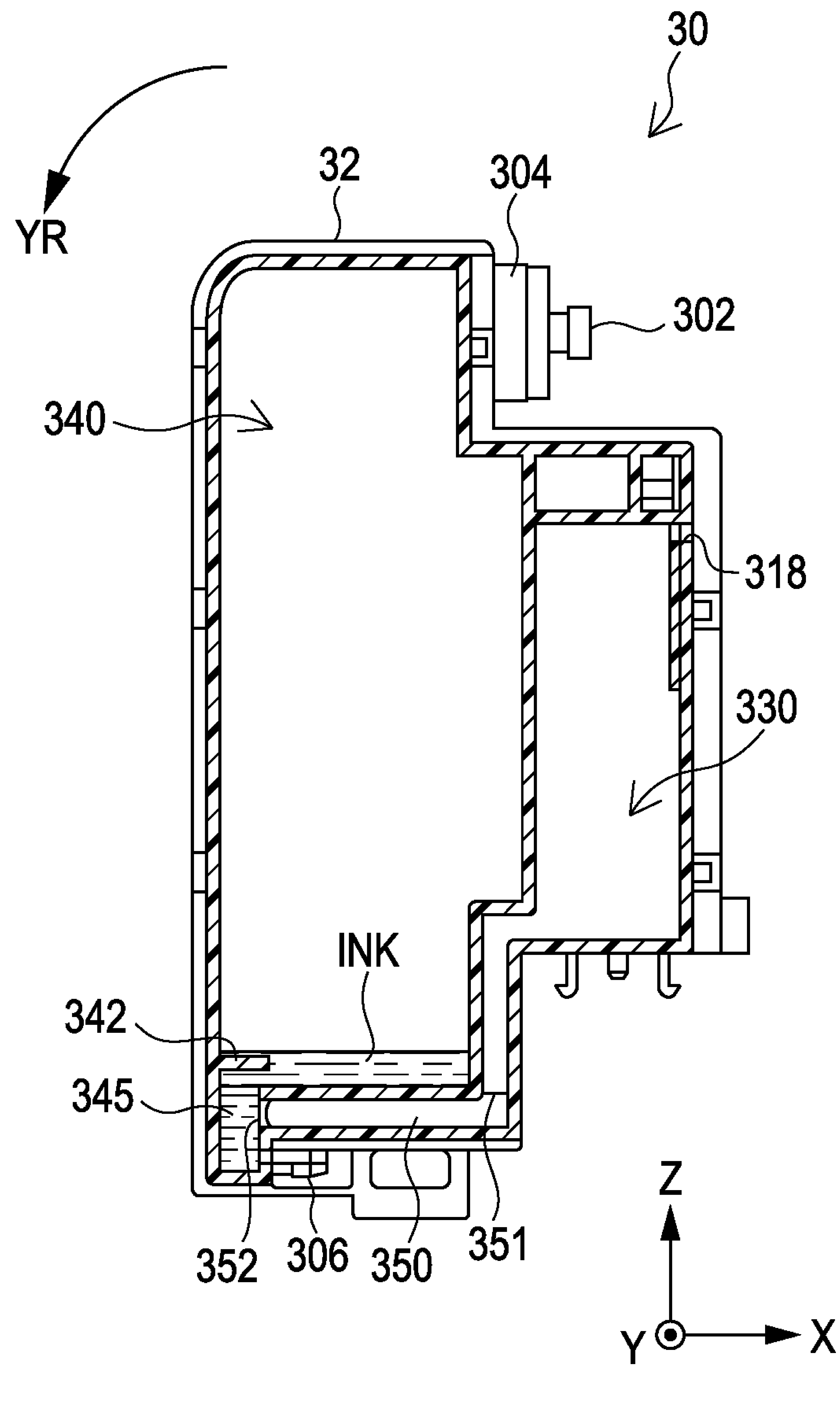

FIG. 13A

STATE BEFORE INK INJECTION

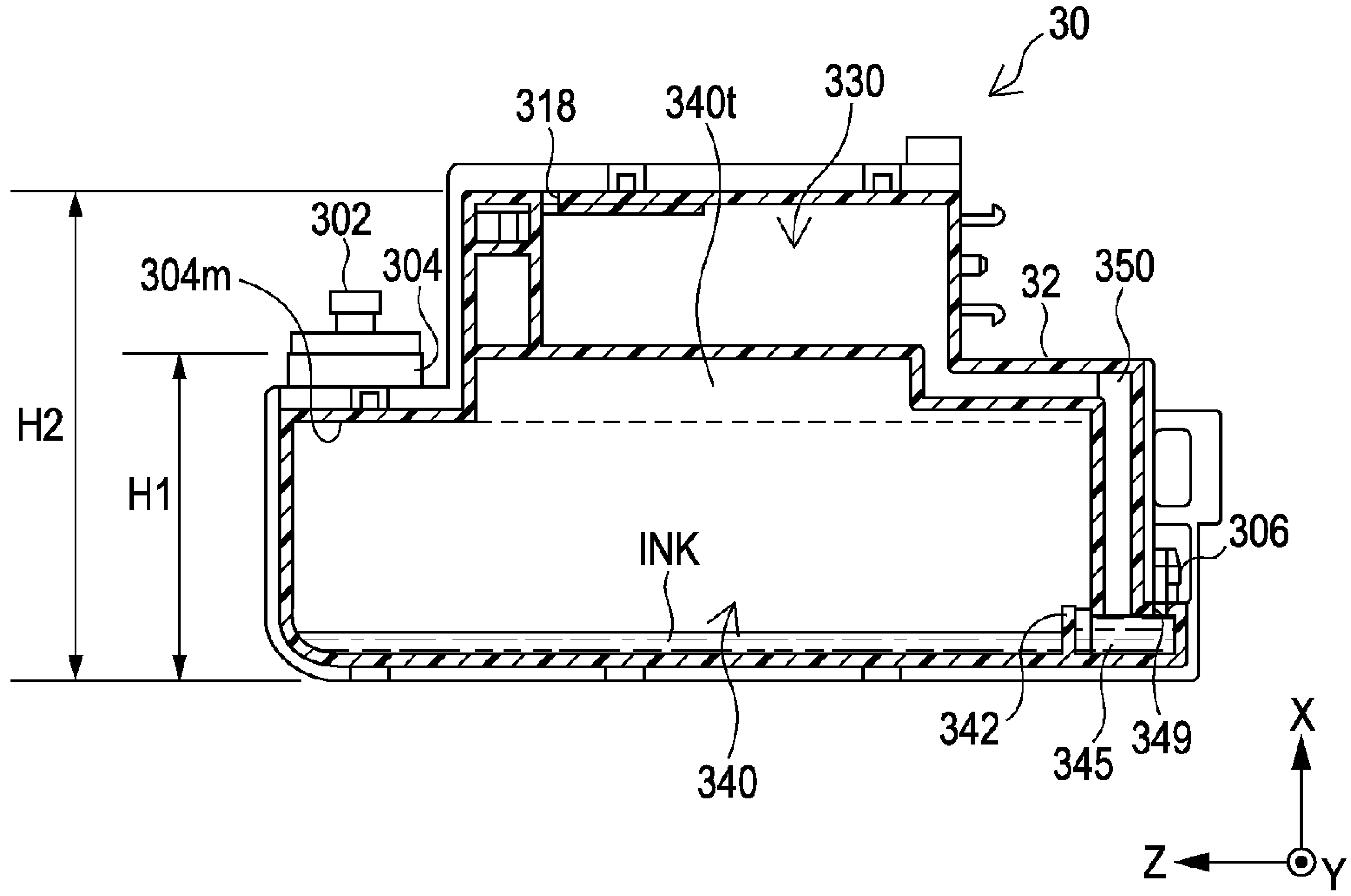

FIG. 13B

STATE AFTER INK INJECTION

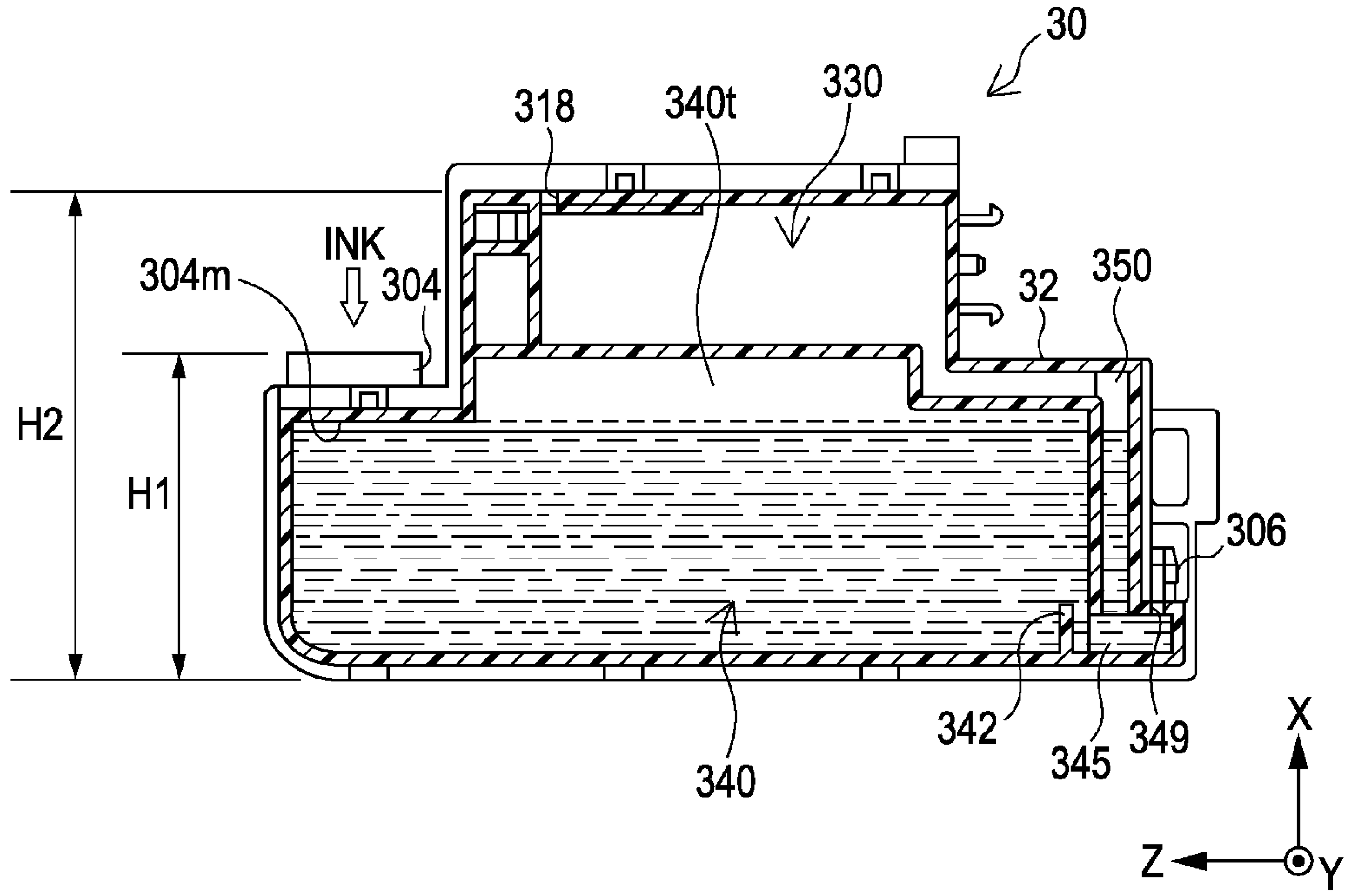

FIG. 14B
USE POSITION: HIGH TEMPERATURE

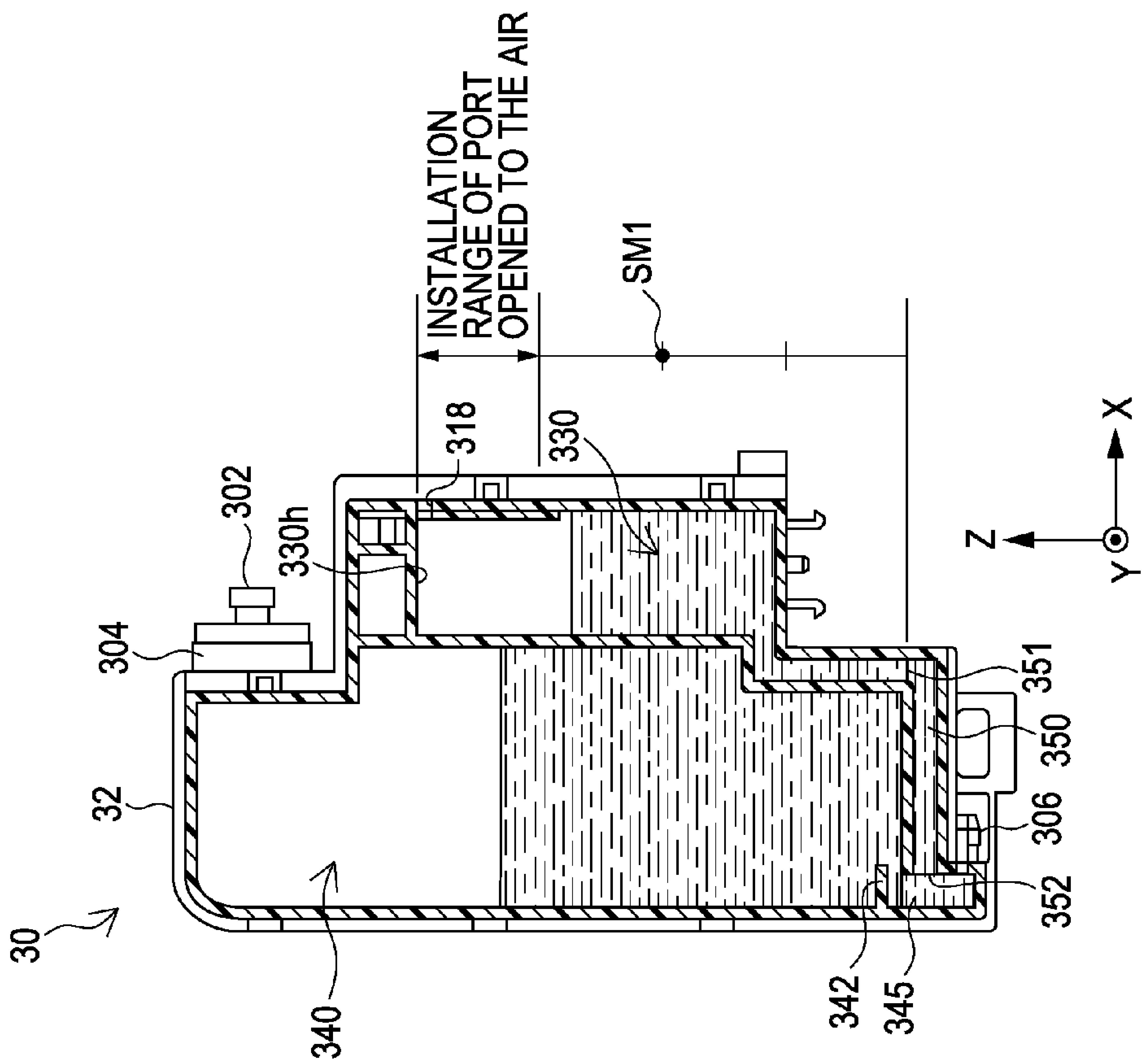

FIG. 14A
USE POSITION: LOW TEMPERATURE

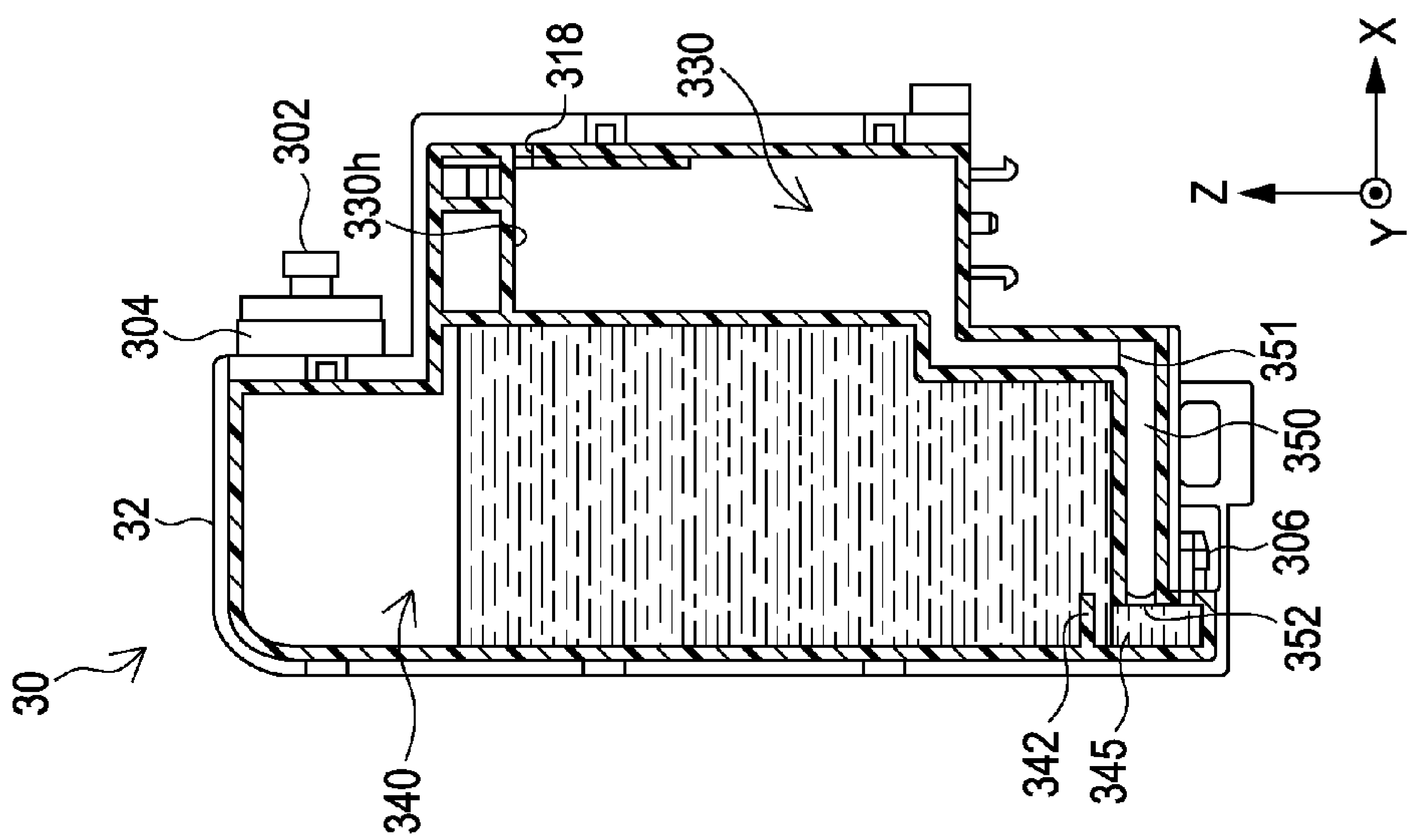

FIG. 15A
INJECTION POSITION: LOW TEMPERATURE

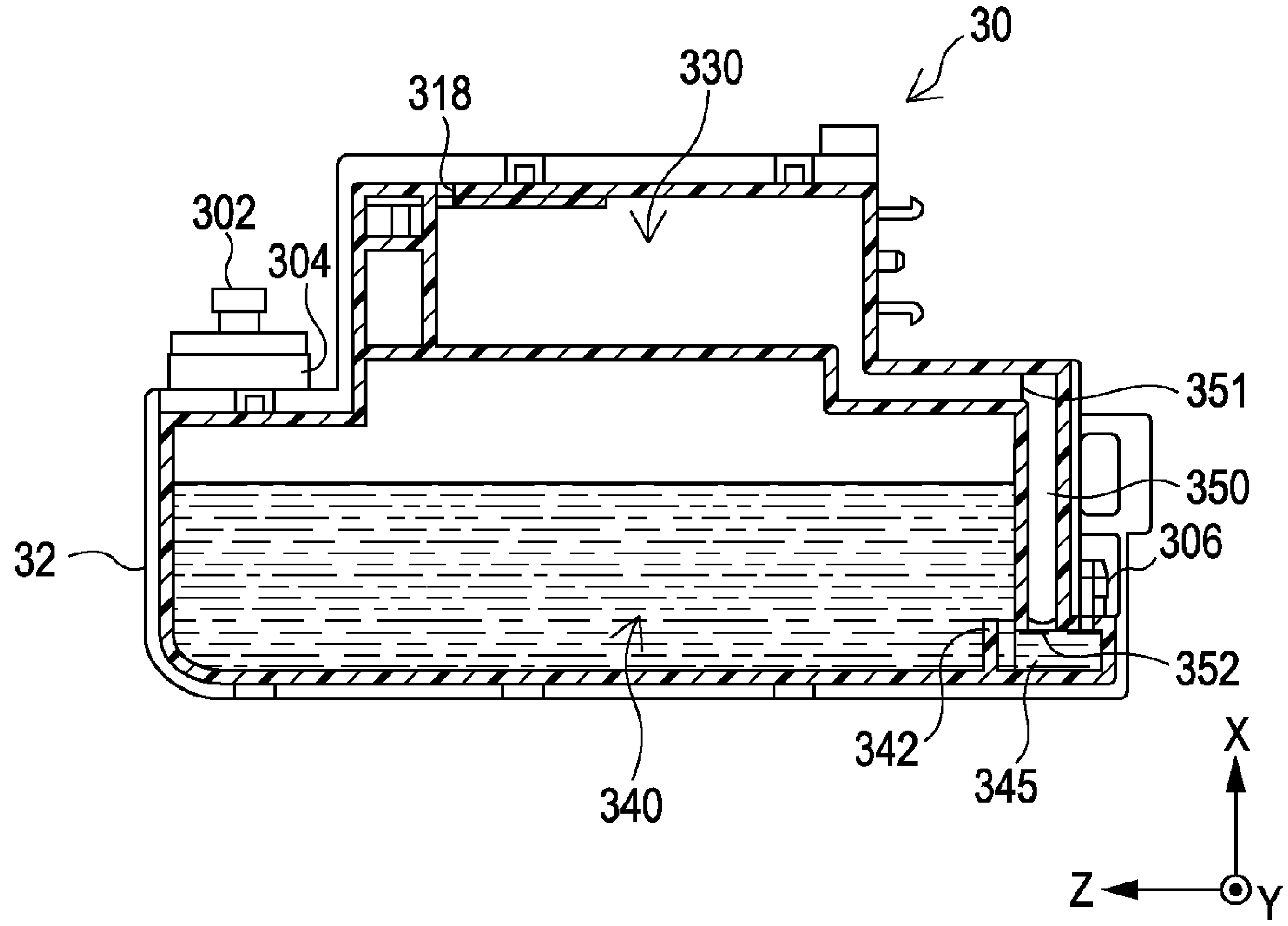

FIG. 15B
INJECTION POSITION: HIGH TEMPERATURE

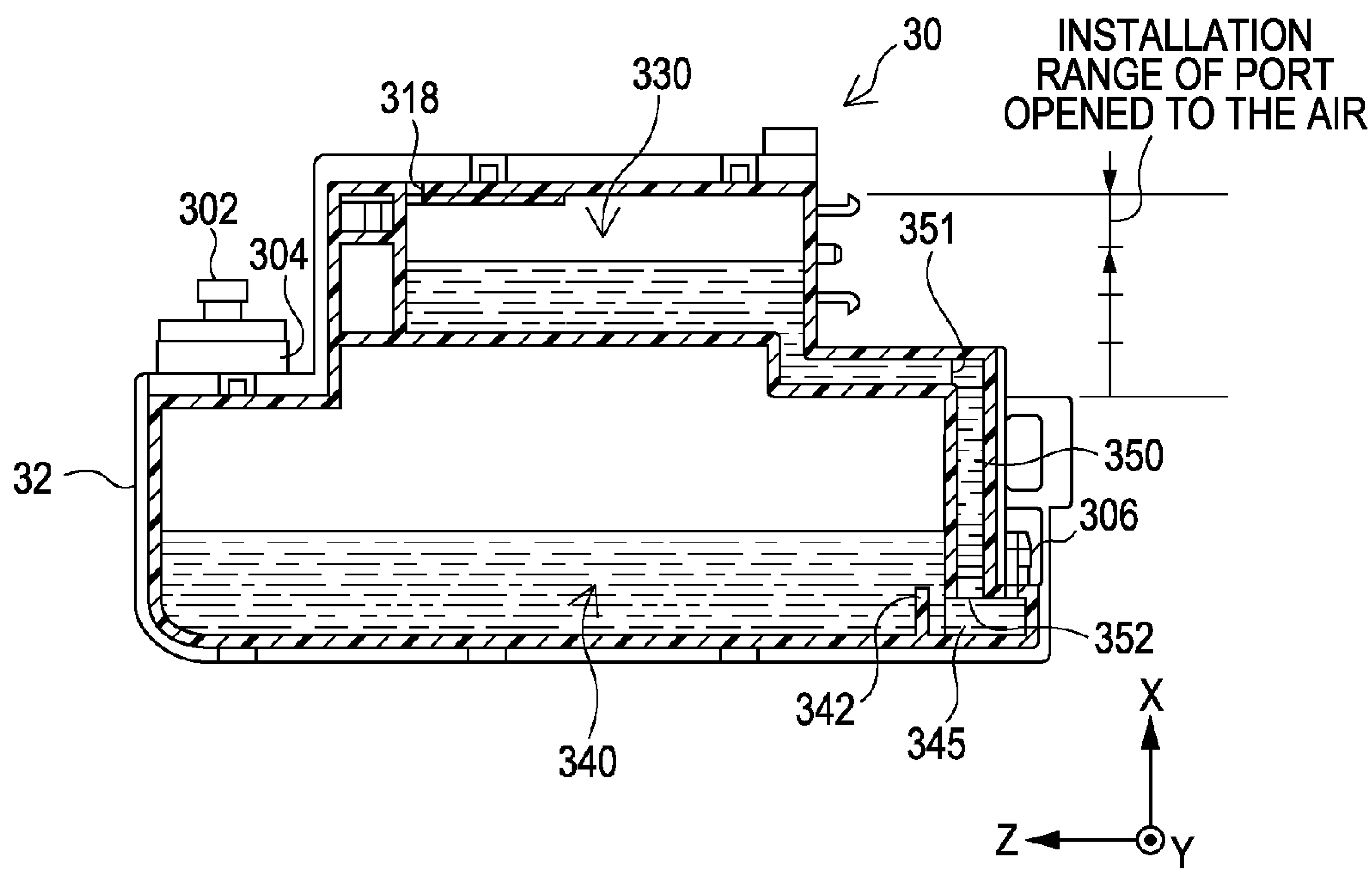

FIG. 16A
UPSIDE-DOWN POSITION

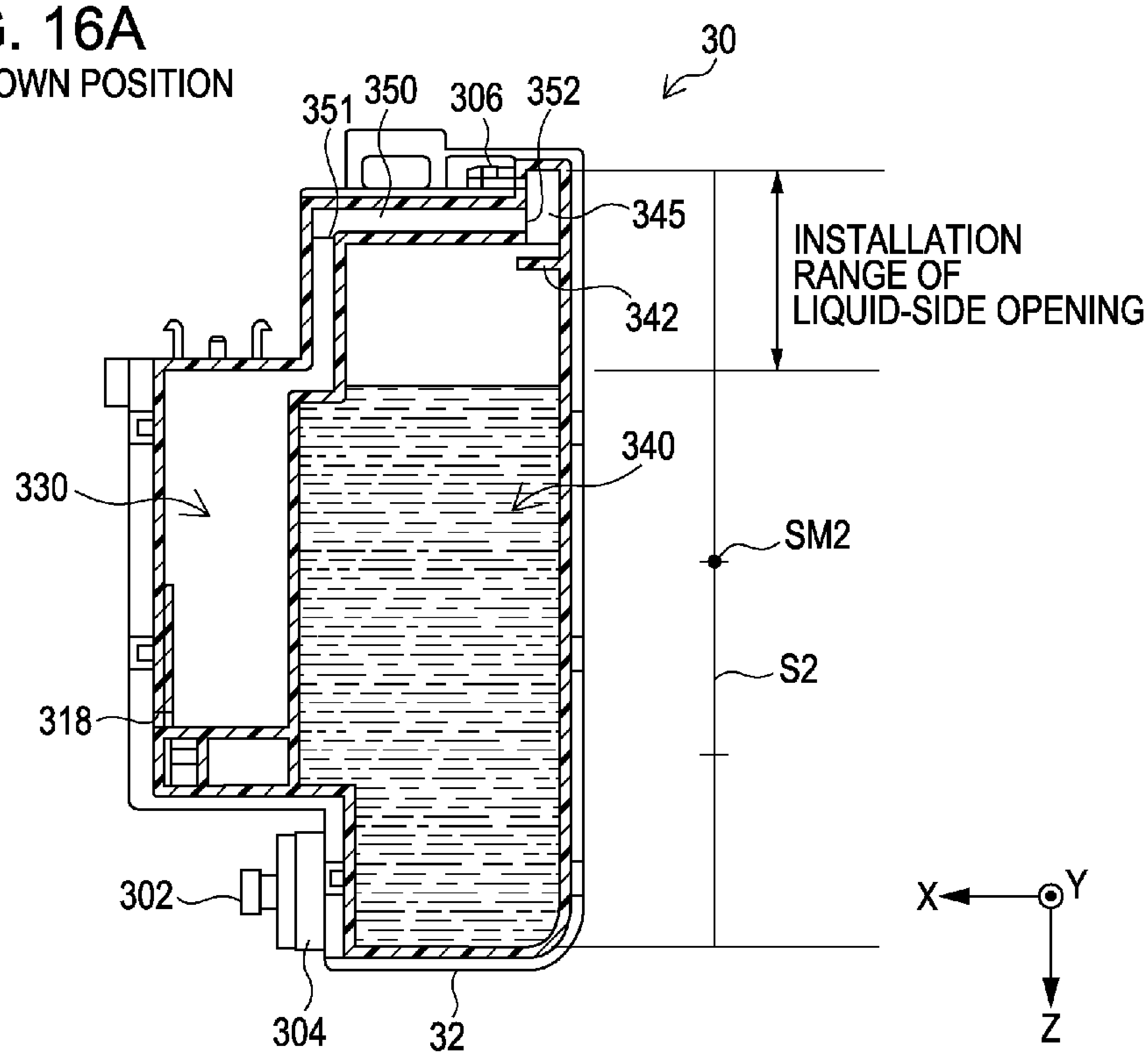

FIG. 16B
POSITION IN WHICH INJECTION
PORT IS DOWNWARD

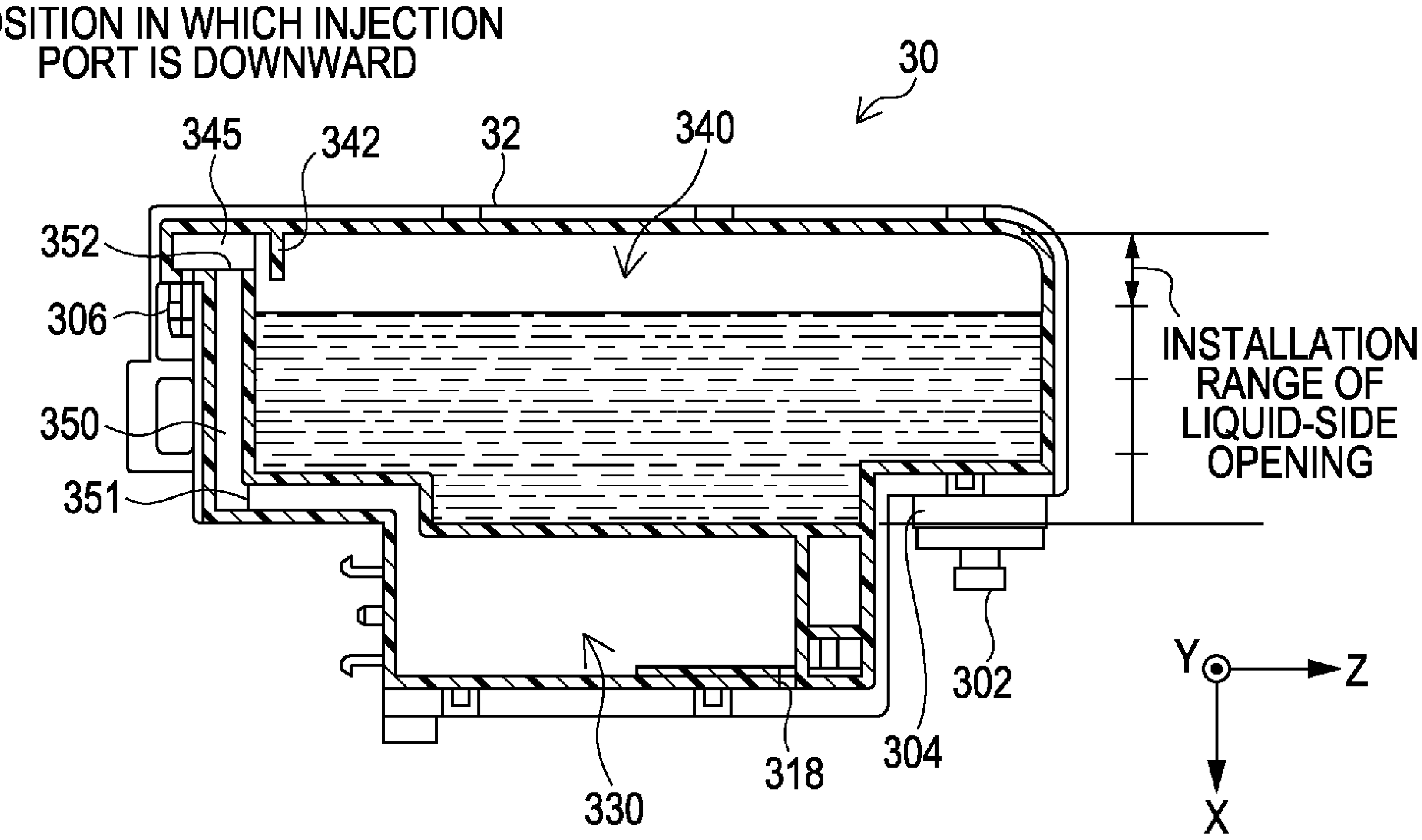

FIG. 17A

POSITION IN WHICH FILM BECOMES BOTTOM FACE

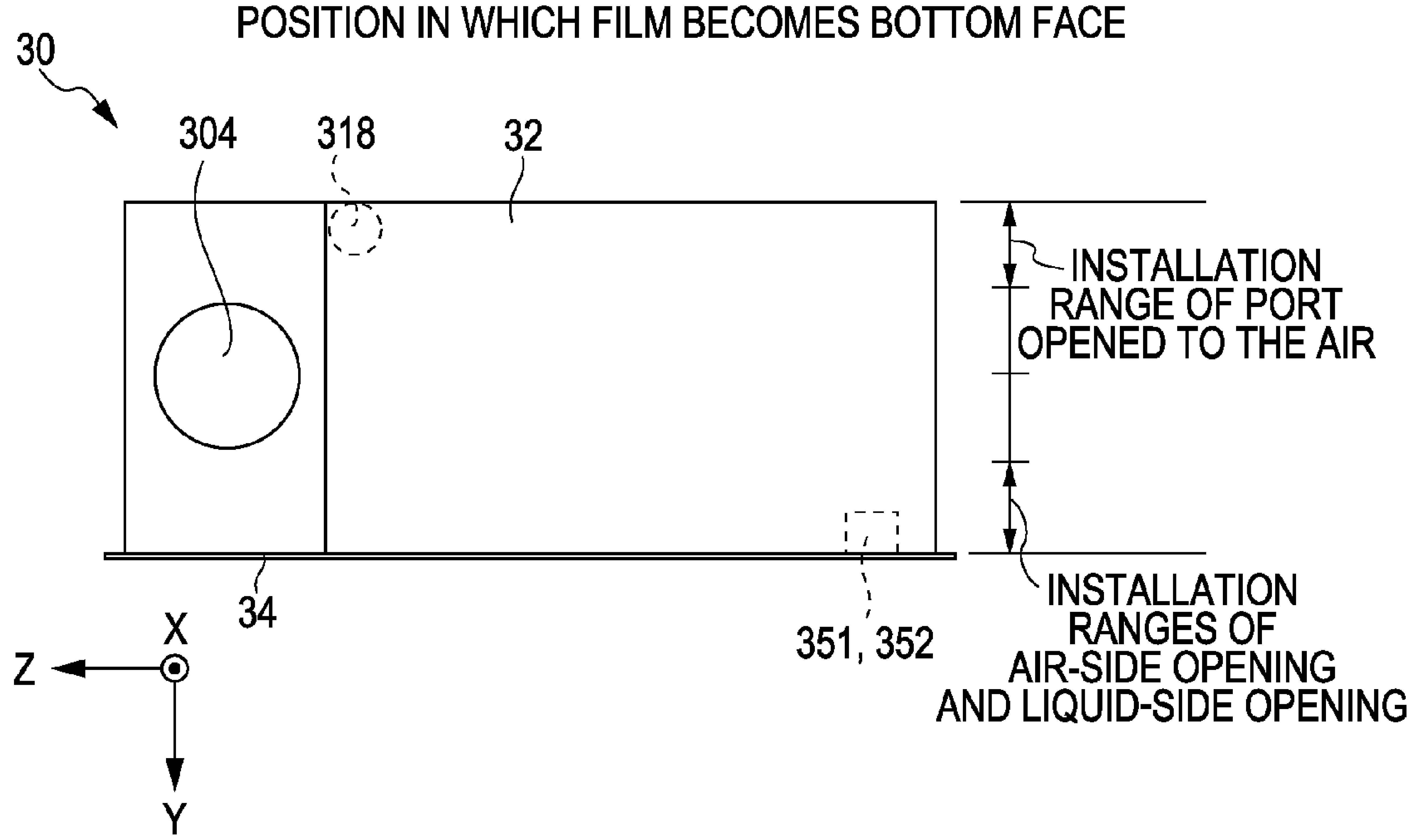

FIG. 17B

POSITION IN WHICH FILM BECOMES TOP FACE

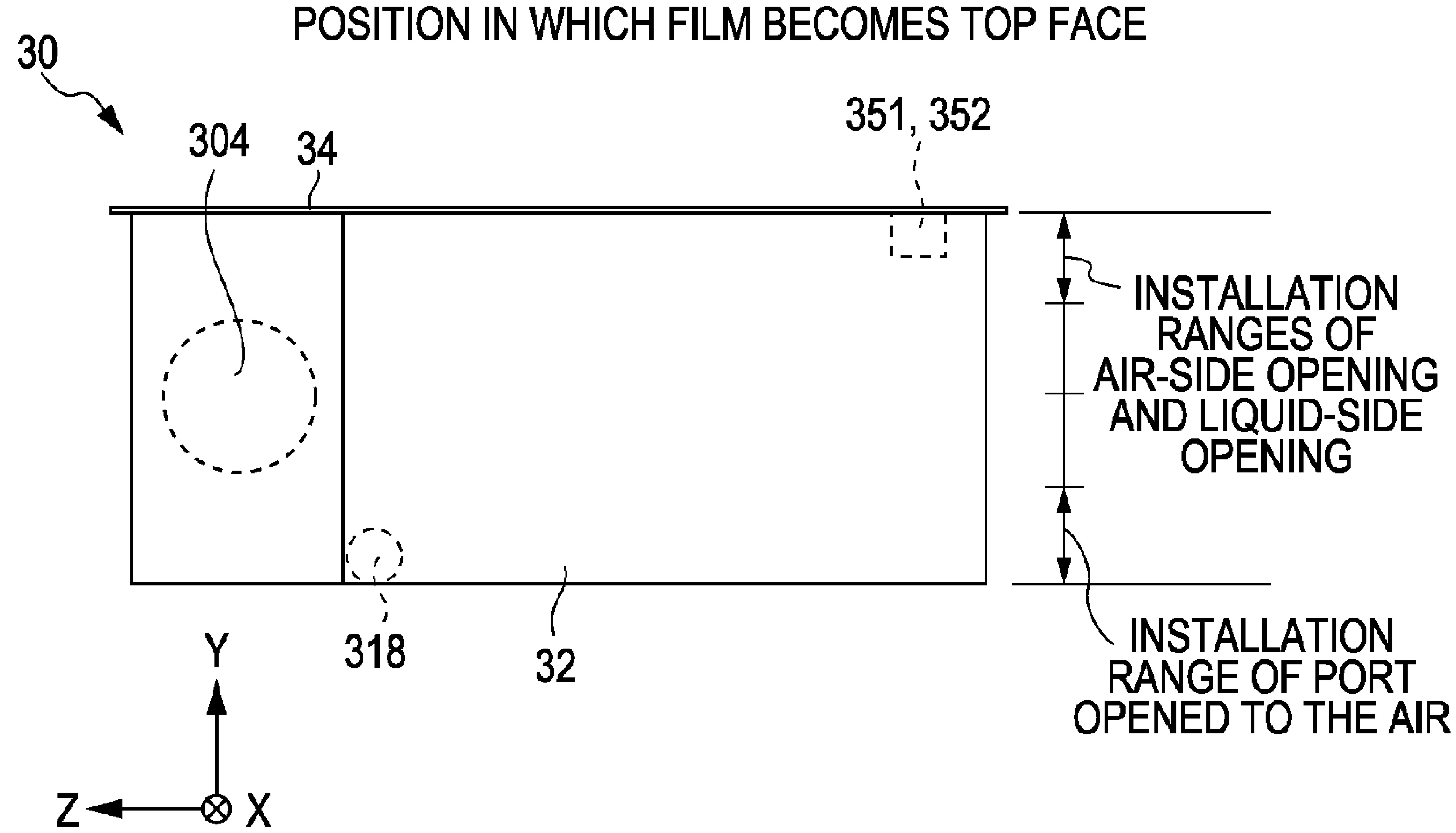

FIG. 18

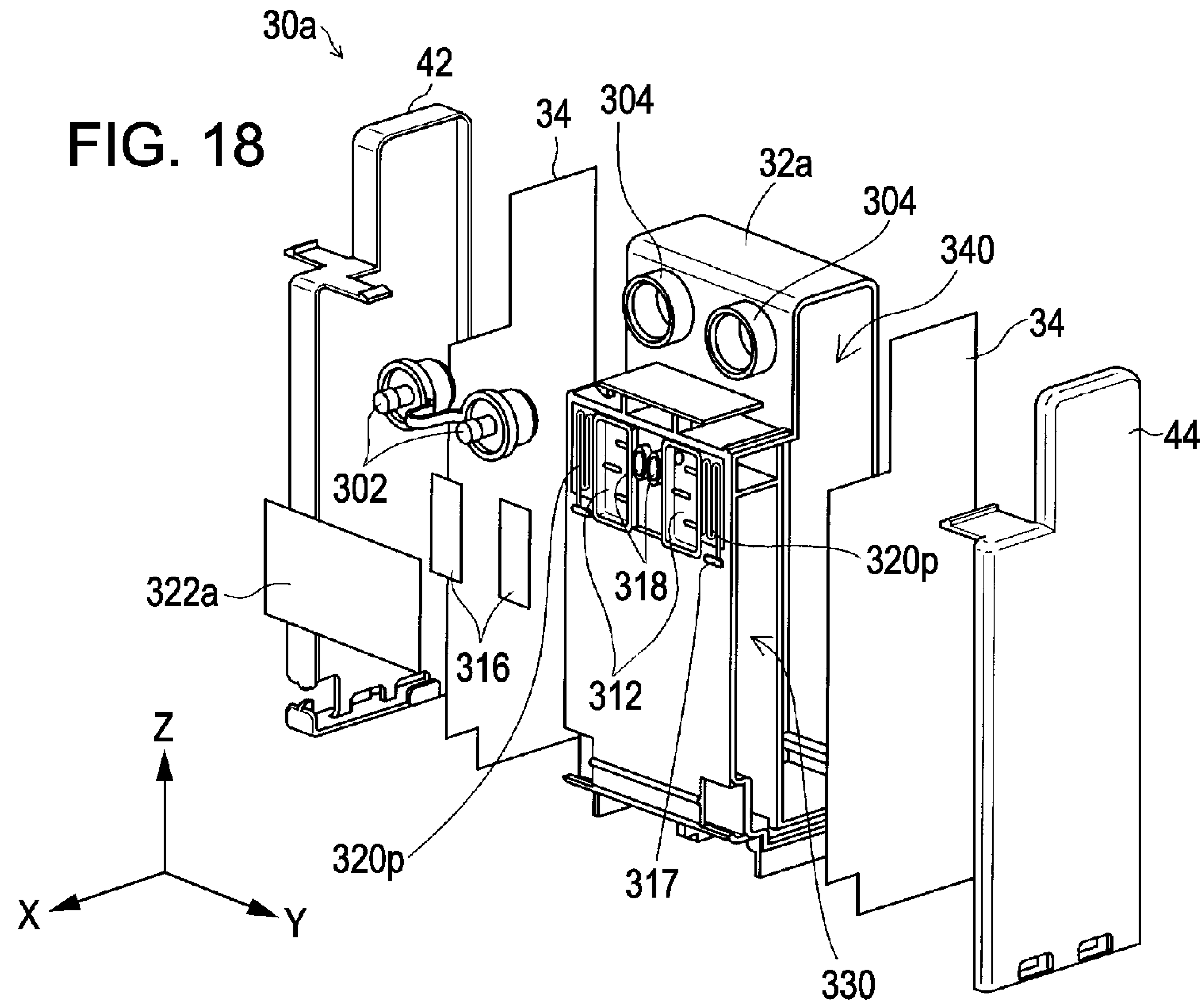
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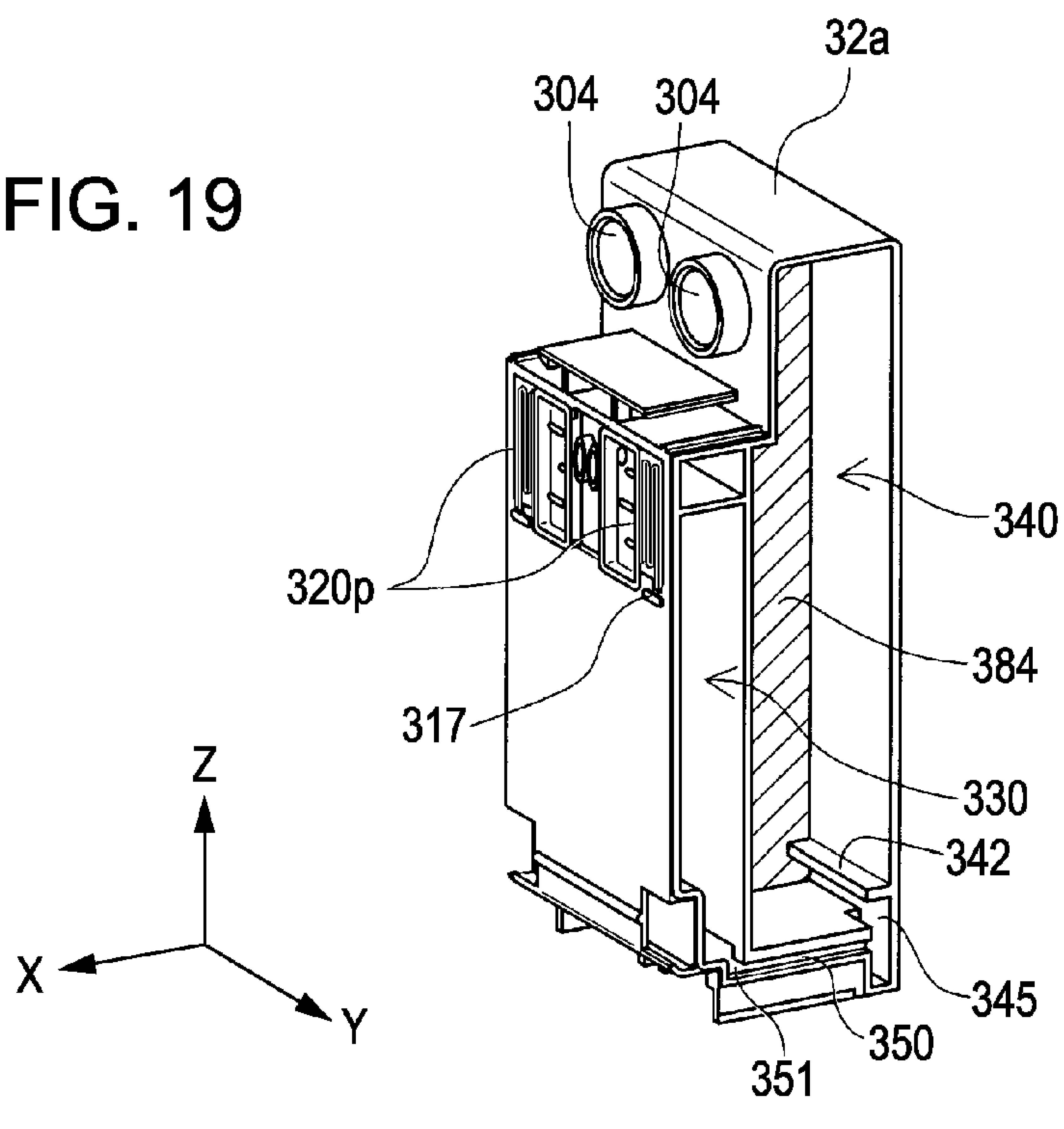
FIG. 19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LIQUID ACCOMMODATING CONTAINER, TANK UNIT, AND LIQUID EJECTING SYSTEM

This application claims priority to Japanese Patent Application No. 2010-160364, filed Jul. 15, 2010, the entirety of which is incorporated by reference herein.

BACKGROUND

1. Technical Field

The present invention relates to a liquid accommodating container, a tank unit provided with a plurality of liquid accommodating containers, and a liquid ejecting system provided with the liquid accommodating containers.

2. Related Art

A printer that is one example of a liquid ejecting apparatus performs printing by discharging ink from a recording head onto a recording target (for example, printing paper). As the technique of supplying ink to a recording head, a technique of supplying ink from an ink cartridge disposed on a recording head to the recording head and also supplying ink from an ink tank disposed outside a liquid ejecting apparatus to the ink cartridge or the head through a tube is known (for example, JP-A-2005-219483, JP-A-2005-1284, and JP-A-2005-199693). The ink tank can contain a large volume of ink compared to the ink cartridge. Further, the ink tank is provided with an ink injection port, so that a user can easily inject (replenish) ink from the ink injection port.

JP-A-2007-253328 and JP-A-2004-209847 are examples of the related art.

The ink tank is provided with an ink injection port for injecting ink and a gas suction port (a flow path opened to the air) for introducing air into the ink tank, as in JP-A-2005-219483. The ink injection port is blocked by a removable plug. On the other hand, in order to make air be taken from the outside into the ink tank in accordance with consumption of ink, the flow path opened to the air needs to be configured such that at least gas (air) can be ventilated.

Therefore, if the state of the ink tank changes in a state where ink is contained in the ink tank, there is a case where ink flows out from the flow path opened to the air toward the outside. For example, if the position of the ink tank changes due to transportation or the like of the ink tank, there is a case where ink flows out from the flow path opened to the air toward the outside. Further, there is a case where air in the ink tank expands due to, for example, a change in the temperature of the inside of the ink tank, so that ink is extruded to the flow path opened to the air.

Such problems are not limited to the ink tank and are problems common to a liquid accommodating container which is for accommodating therein liquid that a liquid ejecting apparatus ejects and in which a liquid injection port and a flow path opened to the air are separately provided.

SUMMARY

An advantage of some aspects of the invention is that it provides a technique by which in a liquid accommodating container in which a liquid injection port and a flow path opened to the air are separately provided, even in a case where the state of the liquid accommodating container has changed, a possibility that liquid may flow out from the flow path opened to the air toward the outside can be reduced.

The invention can be realized as the following aspects or applications.

Application 1

A liquid accommodating container for supplying liquid to a liquid ejecting apparatus, including: a liquid accommodating chamber for accommodating the liquid; a liquid injection port which is for injecting the liquid into the liquid accommodating chamber and on which a plug member that blocks the liquid injection port is detachably mounted; a flow path opened to the air for introducing external air into the liquid accommodating chamber in accordance with consumption of the liquid in the liquid accommodating chamber; and a lead-out flow path having one end portion disposed in the liquid accommodating chamber and the other end portion opened toward the outside, thereby making the liquid in the liquid accommodating chamber flow toward the outside, wherein the flow path opened to the air includes an air accommodating chamber which has a given volume and is located above the liquid accommodating chamber in an injection position of the liquid accommodating container when injecting the liquid into the liquid accommodating chamber, a first flow path having one end portion opened in the air accommodating chamber and the other end portion opened toward the outside, thereby making the air accommodating chamber communicate with the outside, and a second flow path having one end portion opened in the air accommodating chamber and the other end portion opened in the liquid accommodating chamber, thereby making the air accommodating chamber and the liquid accommodating chamber communicate with each other, and capable of holding the liquid by forming a meniscus, and in a use position of the liquid accommodating container when supplying the liquid to the liquid ejecting apparatus, a port opened to the air that is one end portion of the first flow path is provided at a position that is closer to an air chamber uppermost surface than an air chamber middle point which is the middle point of a line segment connecting the air chamber uppermost surface and an air chamber lowermost surface of the air accommodating chamber, with respect to the vertical direction, and that is included in a first corner portion which is one of four corner portions of a first rectangular outermost frame projection plane which is a vertical projection plane which is formed when an inner face of the air accommodating chamber is vertically projected vertically downward in the use position, an air-side opening that is one end portion of the second flow path is provided at a position that is closer to the air chamber lowermost surface than the air chamber middle point and is included in a second corner portion which is at a diagonal position to the first corner portion, among the four corner portions of the outermost frame projection plane, and a liquid-side opening that is the other end portion of the second flow path is provided at a position satisfying the following conditions (a) and (b), (a) a position closer to a liquid chamber lowermost surface than a liquid chamber middle point which is the middle point of a line segment connecting a liquid chamber uppermost surface and the liquid chamber lowermost surface of the liquid accommodating chamber, with respect to the vertical direction in the use position, and (b) a position which is included in a third corner portion that is one of four corner portions of a second rectangular outermost frame projection plane which is a vertical projection plane which is formed when an inner face of the liquid accommodating chamber is vertically projected vertically downward in the use position, and that is at a position equivalent to a diagonal position to the first corner portion in the first rectangular outermost frame projection plane.

According to the liquid accommodating container stated in Application 1, the flow path opened to the air includes the air accommodating chamber having a given volume, between the first flow path and the liquid accommodating chamber. Accordingly, even in a case where air in the liquid accommodating chamber expands due to a change in external temperature, whereby liquid in the liquid accommodating chamber flows to the flow path side opened to the air, the liquid can be retained by the air accommodating chamber. Further, the port opened to the air, the air-side opening, and the liquid-side opening are disposed at the positions stated in Application 1, whereby even in a case where the liquid accommodating container has been made to be in a use position, an upside-down position reverse to the use position, and a position lying on its side, a possibility that liquid may flow out from the flow path opened to the air toward the outside can be reduced. That is, a possibility that liquid may flow out from the port opened to the air to the flow path opened to the air can be reduced.

Application 2

In the liquid accommodating container stated in Application 1, the liquid injection port may be provided at an air-side wall surface on the side where the air accommodating chamber is disposed with respect to the liquid accommodating chamber, among wall surfaces partitioning and forming the liquid accommodating chamber, and in the injection position, the air-side wall surface of the liquid accommodating chamber may become a top face.

According to the liquid accommodating container stated in Application 2, when a user injects (replenishes) liquid into the liquid accommodating chamber, it is possible to urge the user to make a position an injection position. In the injection position, since the liquid accommodating chamber is located below the air accommodating chamber, a possibility that liquid may flow up to the air accommodating chamber at the time of liquid injection can be reduced. Accordingly, in a use position, it is possible to make the height position of a liquid surface directly contacting with air be within a given range (about the height position of the second flow path). Accordingly, it is possible to stably supply liquid to the liquid ejecting apparatus.

Application 3

In the liquid accommodating container stated in Application 1 or 2, a liquid outlet that is one end portion of the lead-out flow path may be provided in the liquid accommodating chamber so as to be located at a position closer to a lowermost surface among a liquid chamber middle point that is the middle point of a line segment connecting an uppermost surface and the lowermost surface of the liquid accommodating chamber and the lowermost surface, with respect to the vertical direction in each of the injection position and the use position of the liquid accommodating container.

According to the liquid accommodating container stated in Application 3, in the use position, since the liquid outlet is located closer to the outermost surface of the liquid accommodating chamber, the remaining amount of liquid in the liquid accommodating chamber can be reduced. Further, in the injection position, since the liquid outlet is located closer to the outermost surface of the liquid accommodating chamber, even in a case where the liquid accommodating container has been made to be in the injection position in a state where the remaining amount of liquid in the liquid accommodating chamber has become small, a state where a liquid surface in the liquid accommodating chamber is at a higher position than the liquid outlet can be more reliably maintained. That is, in the injection position, a state where the liquid outlet contacts with liquid in the liquid accommodating chamber without intervention of air can be more reliably maintained. Accordingly, a possibility that air may flow to the liquid ejecting apparatus side through the liquid outlet at the time of liquid injection can be reduced.

Application 4

In the liquid accommodating container stated in any one of Applications 1 to 3, the liquid accommodating chamber, the air accommodating chamber, and the second flow path may be formed by a container main body of a concave shape in which one face is opened, and a film which blocks the opening.

According to the liquid accommodating container stated in Application 4, the liquid accommodating chamber, the air accommodating chamber, and the second flow path can be easily formed by the container main body of a concave shape and the film which blocks the opening of the container main body. Further, the airtightness of the inside of the liquid accommodating container can be easily secured.

Application 5

The liquid accommodating container stated in Application 4 my further include a cover member that is for protecting the film and covers the film.

According to the liquid accommodating container stated in Application 5, the airtightness of the inside of the liquid accommodating container can be easily secured by the film and liquid leakage due to breakage of the film can also be prevented.

Application 6

A tank unit including: a plurality of liquid accommodating containers which is the liquid accommodating containers stated in Application 4 and in which a facing wall surface portion facing the opening has approximately the same shape as the opening, wherein the plurality of liquid accommodating containers is stacked such that the film of one liquid accommodating container is covered by the facing wall surface portion of the other adjacent liquid accommodating container.

According to the tank unit stated in Application 6, since the film of one liquid accommodating container can be protected by the container main body of the other liquid accommodating container, a tank unit in which a plurality of liquid accommodating containers is combined while compactifying it can be formed.

Application 7

A tank unit including: two liquid accommodating containers stated in Application 4, wherein each facing wall surface portion facing each opening of the two liquid accommodating containers is constituted by a single common member, and the two container main bodies are integrally molded.

According to the tank unit stated in Application 7, it is possible to easily form two liquid accommodating containers. Further, since it is possible to form substantially two liquid accommodating containers by single molding, it is possible to improve the production efficiency of the liquid accommodating container.

Application 8

A liquid ejecting system including: the liquid accommodating container stated in any one of Applications 1 to 4; a liquid ejecting apparatus which includes a head for ejecting the liquid onto a target; and a flow tube that connects the liquid accommodating container and the liquid ejecting apparatus, thereby the liquid in the liquid accommodating chamber flow to the liquid ejecting apparatus.

According to the liquid ejecting system stated in Application 8, a liquid ejecting system can be provided which supplies liquid to the liquid ejecting apparatus by using the liquid accommodating container in which a possibility that liquid may flow out from the flow path opened to the air toward the outside is reduced.

Application 9

In the liquid ejecting system stated in Application 8, the liquid ejecting apparatus may be a printer, and the liquid accommodating chamber of the liquid accommodating container may accommodate ink.

According to the liquid ejecting system stated in Application 9, a liquid ejecting system can be provided which supplies ink to the printer by using the liquid accommodating container in which a possibility that ink may flow out from the flow path opened to the air toward the outside is reduced.

In addition, the invention can be realized in various aspects and can be realized in aspects such as a manufacturing method of the above-described liquid accommodating container and a liquid ejecting method using the above-described liquid ejecting system, besides the above-described liquid accommodating container, the tank unit, and the liquid ejecting system provided with a liquid ejecting apparatus and a liquid accommodating container.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be described with reference to the accompanying drawings, wherein like numbers reference like elements.

FIGS. **1**A and **1**B are diagrams for describing a liquid ejecting system of the first example.

FIG. **2** is an exterior perspective view of an ink tank.

FIG. **3** is a diagram for further describing the ink tank.

FIG. **4** is a diagram conceptually illustrating a path ranging from an air introduction port to a liquid lead-out portion.

FIG. **5** is a diagram for describing ink supply.

FIG. **6** is an exploded perspective view of the ink tank.

FIG. **7** is a diagram for describing a first flow path.

FIG. **8** is a perspective view of a tank main body.

FIGS. **9**A and **9**B are diagrams for describing the disposition position of an air-side opening.

FIGS. **10**A and **10**B are diagrams for describing the installation position of a liquid-side opening.

FIGS. **11**A and **11**B are diagrams for describing the installation position of a liquid outlet.

FIG. **12** is a diagram illustrating a state where the remaining amount of ink in a liquid accommodating chamber has become small.

FIGS. **13**A and **13**B are diagrams illustrating the state of ink injection into the ink tank.

FIGS. **14**A and **14**B are diagrams for describing the state of ink in a use position.

FIGS. **15**A and **15**B are diagrams for describing the state of ink in an injection position.

FIGS. **16**A and **16**B are diagrams for describing the state of ink in another position.

FIGS. **17**A and **17**B are a second diagram for describing the state of ink in another position.

FIG. **18** is an exploded perspective view of an ink tank of the second example.

FIG. **19** is a perspective view of a tank main body of the second example.

DESCRIPTION OF EXEMPLARY EMBODIMENTS

Next, embodiments of the invention will be described in the flowing order.

A. First Example

B. Second Example

C. Modified Example

A. FIRST EXAMPLE

A-1. Configuration of Liquid Ejecting System

FIGS. **1**A and **1**B are diagrams for describing a liquid ejecting system **1** of the first example. FIG. **1**A is an exterior perspective view of the liquid ejecting system **1**. FIG. **1**B is an exterior perspective view of the liquid ejecting system **1** and is a diagram illustrating liquid accommodating containers **30** of the first example of the invention. In addition, in FIGS. **1**A and **1**B, X, Y, and Z axes being right angles to each other are shown in order to specify a direction. In addition, also with respect to the subsequent drawings, the X, Y, and Z axes are shown as necessary.

As shown in FIG. **1**A, the liquid ejecting system **1** includes an ink jet printer **12** (also simply referred to as a "printer **12**") as a liquid ejecting apparatus, and a tank unit **50**. The printer **12** includes a paper feed section **13**, a paper discharge section **14**, a carriage **16** and four sub-tanks **20**. The four sub-tanks **20** contain ink of different colors. Specifically, the four sub-tanks **20** are a sub-tank **20**Bk that contains black ink, a sub-tank **20**Cn that contains cyan ink, a sub-tank **20**Ma that contains magenta ink, and a sub-tank **20**Yw that contains yellow ink. The four sub-tanks **20** are mounted on the carriage **16**.

Printing paper set in the paper feed section **13** is transported to the inside of the printer **12** and the printing paper after printing is discharged from the paper discharge section **14**.

The carriage **16** is movable in a main scanning direction (a paper width direction). This movement is performed through a timing belt (not shown) by the driving of a stepping motor (not shown). A recording head (not shown) is provided and mounted on the lower surface of the carriage **16**. Ink is ejected from a plurality of nozzles of the recording head onto the printing paper, whereby printing is performed. In addition, various components constituting the printer **12**, such as the timing belt or the carriage **16**, are housed inside a case **10**, being protected thereby.

The tank unit **50** includes a top case **54**, a first side case **56**, and a second case **58**. These cases **54**, **56**, and **58** are molded by synthetic resin such as polypropylene or polystyrene. Further, as shown in FIG. **1**B, the tank unit **50** is provided with ink tanks **30** as four liquid accommodating containers inside the cases (cover members) **54**, **56**, and **58**. The tank unit **50** is more stably installed at a given place (for example, a desk or a shelf) by the cases **54**, **56**, and **58**. The four ink tanks **30** contain ink corresponding to colors that the four sub-tanks **20** contain. That is, the four ink tanks **30** respectively contain black ink, cyan ink, magenta ink, and yellow ink. In addition, the ink tank **30** can contain a larger amount of ink than the sub-tank **20**.

The ink tank **30** with ink of each color contained is connected to the sub-tank **20** containing ink of a corresponding color by a hose **24**. If ink is ejected from the recording head, so that the ink in the sub-tank **20** is consumed, the ink in the ink tank **30** is supplied to the sub-tank **20** through the hose **24**. In this way, the liquid ejecting system **1** can continue printing continuously without an interruption operation of the printer **12**. The hose **24** is formed of a member having elasticity, such as synthetic rubber. In addition, it is also acceptable to directly supply ink from the ink tank **30** to the recording head through the hose **24** without providing the sub-tank **20**.

FIG. **2** is an exterior perspective view of the ink tank **30**. The ink tank **30** includes a tank main body **32** and a film **34**. The tank main body **32** has a concave shape and one face thereof is opened. The film **34** is adhered to the tank main body **32** so as to block an opening of the tank main body **32** in order to secure the airtightness of the inside of the tank main body **32**. In the ink tank **30**, the film **34** and a facing wall surface portion ff of the tank main body **32** facing the film **34** have approximately the same shape. That is, the ink tank **30** has a polygonal column shape with the film **34** and the facing wall surface portion ff as a bottom. In addition, the details of the tank main body **32** will be described later.

The ink tank **30** further has a plug member **302**. The plug member **302** is mounted in a liquid injection port **304**. The plug member **302** can be removed from the liquid injection port **304**, and by removing it, it is possible to inject (replenish) ink from the liquid injection port **304** into the ink tank **30**.

Further, the ink tank **30** has a first fitting portion **324** and a second fitting portion **325**. The first fitting portion **324** has a projection shape. The second fitting portion **325** has a through-hole **325***a*. The ink tanks **30** adjacent to each other are connected (stacked) to each other using the first and second fitting portions **324** and **325**. That is, the ink tanks **30** adjacent to each other are connected to each other such that the film **34** is covered by the facing wall surface portion ff of the adjacent ink tank **30**. In this way, since the film **34** of any one ink tank **30** can be protected by the facing wall surface portion ff of the other adjacent ink tank **30**, the tank unit **50** in which a plurality of ink tanks **30** is combined while compactifying it can be formed.

Further, the ink tank **30** has an air introduction port **317** and a liquid lead-out portion **306**. The air introduction port **317** is one end portion of a flow path opened to the air for introducing external air into the ink tank **30**. The liquid lead-out portion **306** is tubular and has one end portion disposed in a liquid accommodating chamber **340** of the ink tank **30** and the other end portion **348** opened toward the outside. That is, in the liquid lead-out portion **306**, a lead-out flow path that makes the ink in the liquid accommodating chamber **340** flow toward the outside is formed in the inside thereof. The liquid lead-out portion **306** is connected to the hose **24** (FIG. **1**B), so that the ink in the ink tank **30** flows toward the printer **12** side through the hose **24**.

FIG. **3** is a diagram for further describing the ink tank **30**. FIG. **3** is a perspective view of the tank unit **50** and in order to facilitate explanation, illustration of the top case **54** (FIG. **1**A) is omitted. The through-hole **325***a* of the second fitting portion **325** and the first fitting portion **324** of the ink tanks **30** adjacent to each other are fitted to each other, whereby the ink tanks **30** adjacent to each other are connected to each other. In the ink tank **30** (the ink tank **30** on the Y-axis positive direction side) in which the film **34** is exposed to the outside, among the ink tanks **30** of both ends, the film **34** is covered by the first side case **56**. In this way, the film **34** is protected, so that leakage of ink to the outside due to breakage of the film **34** by impact from the outside can be prevented. It is possible to newly add the ink tank **30** to the tank unit **50** or remove the ink tank **30** from the tank unit **50** in accordance with the number of colors of ink that the printer **12** ejects. In the use position of the ink tank **30** when supplying the ink in the ink tank **30** to the printer **12** side, the Z-axis negative direction becomes a vertically downward direction and the Z-axis positive direction becomes a vertically upward direction.

A-2. Detailed Configuration of Ink Tank **30**

Before explanation of the detailed configuration of the ink tank **30**, in order to facilitate understanding, a path ranging from the air introduction port **317** to the liquid lead-our portion **306** will be conceptually described with reference to FIG. **4**. FIG. **4** is a diagram conceptually illustrating a path ranging from the air introduction port **317** to the liquid lead-out portion **306**.

The path ranging from the air introduction port **317** to the liquid lead-out portion **306** can be broadly divided into a flow path opened to the air **300** and the liquid accommodating chamber **340**. The flow path opened to the air **300** is constituted by a first flow path **310**, an air accommodating chamber **330**, and a second flow path **350** in order from the upstream.

In the first flow path **310**, a port opened to the air **318** that is one end portion thereof is opened in the air accommodating chamber **330** and the air introduction port **317** that is the other end portion is opened toward the outside, whereby the air accommodating chamber **330** is made to communicate with the outside. The first flow path **310** includes communication flow paths **317***a* and **320**, a gas-liquid separation chamber **312**, and communication flow paths **314** and **319**. The communication flow path **317***a* communicates at one end portion thereof with the air introduction port **317** and at the other end portion with the communication flow path **320**. The communication flow path **320** communicates at one end portion thereof with the communication flow path **317***a* and at the other end portion with the gas-liquid separation chamber **312**. The communication flow path **320** is a long and thin flow path and suppresses evaporation of moisture of the ink retained in the liquid accommodating chamber **340** from the flow path opened to the air **300** by diffusion. A sheet member **316** is disposed between the upstream and the downstream of the gas-liquid separation chamber **312**. The sheet member **316** has a gas permeable and liquid impermeable property. By disposing the sheet member **316** along the flow path opened to the air **300**, inflow further to the upstream side than the sheet member **316** of ink flowed back from the liquid accommodating chamber **340** is suppressed. In addition, once the sheet member **316** is wet with ink, the sheet member **316** loses its original function as a gas-liquid separation membrane, so that there is a case where air becomes impermeable. Therefore, as will be described later, in this example, the ink tank **30** in which the possibility of back-flow of ink is reduced is provided in the first flow path **310** that is the upstream side further than the air accommodating chamber **330**.

The communication flow paths **319** and **314** make the gas-liquid separation chamber **312** communicate with the air accommodating chamber **330**. Here, one end portion of the communication flow path **314** is the port opened to the air **318**.

The air accommodating chamber **330** has an upper accommodating chamber **337**, a communication flow path **338**, and a lower accommodating chamber **339** in order from the upstream side. The air accommodating chamber **330** has a flow path cross-sectional area larger than the second flow path **350** and given volume. Accordingly, the ink flowed back from the liquid accommodating chamber **340** is retained therein, so that inflow of ink further to the upstream side than the air accommodating chamber **330** can be suppressed.

The second flow path **350** has one end portion **351** opened in the air accommodating chamber **330** and the other end portion **352** opened in the liquid accommodating chamber **340**, thereby making the air accommodating chamber **330** communicate with the liquid accommodating chamber **340**. Further, the second flow path **350** is made to be a flow path in which a flow path cross-sectional area is small to the extent capable of forming a meniscus (liquid surface bridge).

The liquid accommodating chamber **340** accommodates ink and makes ink flow from a liquid outlet **349** of the liquid introduction portion **306** to the sub-tank **20** through the hose **24**. The liquid accommodating chamber **340** has a liquid holding portion **345**. The liquid holding portion **345** has a partition wall **342**. The partition wall **342** intercepts flow of ink in a given direction in the liquid accommodating chamber **340**, thereby suppressing outflow of ink from the liquid holding portion **345** to another portion of the liquid accommodating chamber **340**. Further, as described above, the liquid injection port **304** is provided at the liquid accommodating chamber **340**, so that a user can easily inject (replenish) ink from the liquid injection port **304** into the liquid accommodating chamber **340**.

In order to further facilitate understanding, a state where the ink tank **30** supplies ink to the sub-tank **20** is described using FIG. **5**. FIG. **5** is a diagram for describing ink supply from the ink tank **30** to the sub-tank **20**. FIG. **5** schematically illustrates the states of the insides of the ink tank **30**, the hose **24**, and the printer **12**.

The liquid ejecting system **1** is installed on a given horizontal surface sf. The liquid lead-out portion **306** of the ink tank **30** and a liquid receiving portion **202** of the sub-tank **20** are connected to each other through the hose **24**. The sub-tank **20** is molded by synthetic resin such as polystyrene or polyethylene. The sub-tank **20** includes an ink retention chamber **204**, an ink flowing path **208**, and a filter **206**. In the ink flowing path **208**, an ink supply needle **16***a* of the carriage **16** remains inserted. In a case where impurities such as foreign matter are mixed in ink, the filter **206** captures the impurities, thereby preventing inflow of the impurities to a recording head **17**. The ink in the ink retention chamber **204** flows through the ink flowing path **208** and the ink supply needle **16***a* by suction from the recording head **17**, thereby being supplied to the recording head **17**. The ink supplied to the recording head **17** is ejected toward the outside (the printing paper) through the nozzle.

In addition, in the injection position when injecting ink into the ink tank **30**, the ink tank **30** is installed on the given horizontal surface sf such that the X-axis negative direction becomes a vertically downward direction. After ink is injected from the liquid injection port **304** into the liquid accommodating chamber **340** in the injection position, in a case where the liquid injection port **304** is hermetically sealed by the plug member **302**, whereby a use position is made, air in the liquid accommodating chamber **340** expands, so that the liquid accommodating chamber **340** is maintained at negative pressure. Further, the air accommodating chamber **330** communicates with the port opened to the air **318**, thereby being maintained at the atmospheric pressure.

In the use position, the second flow path **350** which forms a meniscus is disposed so as to be located at a position lower than the recording head **17**. Accordingly, a water head difference d**1** is generated. In addition, the water head difference d**1** in a state where a meniscus is formed in the second flow path **350** in the use position is also called a "stationary time water head difference d**1**".

The ink in the ink retention chamber **204** is suctioned by the recording head **17**, whereby the ink retention chamber **204** becomes equal to or more than given negative pressure. If the ink retention chamber **204** becomes equal to or more than given negative pressure, the ink in the liquid accommodating chamber **340** is supplied to the ink retention chamber **204** through the hose **24**. That is, ink corresponding to an amount flowed out to the recording head **17** is automatically replenished from the liquid accommodating chamber **340** to the ink retention chamber **204**. In other words, suction power (negative pressure) from the printer **12** side becomes larger than the water head difference d**1** which is generated by a difference in vertical height between an ink liquid surface contacting with the air accommodating chamber **330** in the ink tank **30** and the recording head (specifically, the nozzle), whereby ink is supplied from the liquid accommodating chamber **340** to the ink retention chamber **204**.

If the ink in the liquid accommodating chamber **340** is consumed, air G (also referred to as an "air bubble G") in the air accommodating chamber **330** is introduced into the liquid accommodating chamber **340** through the communication portion **350**. Accordingly, the liquid surface in the liquid accommodating chamber **340** is lowered.

Based on the above, the detailed configuration of the ink tank **30** will be described with reference to FIGS. **6** to **8**. FIG. **6** is an exploded perspective view of the ink tank **30**. FIG. **7** is a diagram for describing the first flow path **310**. FIG. **8** is a perspective view of the tank main body **32**. In addition, FIG. **7** is a diagram illustrating the first flow path **310** when FIG. **6** is viewed from the X-axis positive direction side, and flow of air from the air introduction port **317** to the port opened to the air **318** is schematically shown by an arrow. In addition, FIG. **7** omits illustration of the sheet members **316** and **322**.

As shown in FIG. **6**, the ink tank **30** is provided with the tank main body **32**, the plug member **302**, and a plurality of sheet members **34**, **316**, and **322** (also referred to as the "films **34**, **316**, and **322**"). The tank main body **32** is molded by synthetic resin such as polypropylene. Further, the tank main body **32** is translucent, so that the amount of ink in the inside can be confirmed from the outside. The shape of the tank main body **32** is a concave shape in which one side face is opened. Ribs **362** having various shapes are formed at a concave portion of the tank main body **32**. In addition, for convenience sake of explanation, with regard to the tank main body **32**, a face on the Z-axis positive direction side is set to be a top face fa and a face on the Z-axis negative direction side is set to be a bottom face fb. Further, with regard to four side faces of the tank main body **32** in the use position, a face on the X-axis positive direction side is set to be a right side face fc, a face on the X-axis negative direction side is set to be a left side face fd, a face (that is, a face in which an opening is formed) of the Y-axis positive direction side is set to be a front face fe, and a face on the Y-axis negative direction side is set to be a rear face ff. Further, for convenience sake of explanation, in the use position, the X-axis direction (a direction in which the left side face fd and the right side face fc face each other) is set to be a width direction, the Y-axis direction (a direction in which the front face fe and the rear face ff face each other) is set to be a depth direction, and the Z-axis direction (the vertical direction) is set to be a height direction.

The film **34** is tightly adhered to the end surfaces of the ribs **362** and the end surface of an outer frame of the tank main body **32** such that a clearance is not formed. In this way, a plurality of small rooms is formed. Specifically, mainly, the air accommodating chamber **330**, the liquid accommodating chamber **340**, the communication portion **350** that is the second flow path, and the liquid holding portion **345** that is one portion of the liquid accommodating chamber **340** are formed. That is, rather than welding the same member (synthetic resin) as the tank main body **32** to the end surfaces of the ribs **362** and the end surface of the outer frame of the tank main body **32**, by using the film **34**, adhesion to the tank main body **32** can be performed such that a clearance is not formed. That is, by using the film **34**, the airtightness of the inside of the ink tank **30** can be easily secured. On the other hand, protection of the film **34** from external impact is performed by the first side case **56** (FIG. **3**) or the facing wall surface portion ff (FIG. **6**) of the adjacent ink tank **30**. In addition, the details of each of these rooms (each configuration) will be described later.

In the right side face fc of the tank main body **32**, the liquid injection port **304** is provided. That is, the liquid injection port **304** is provided in a wall surface on the side where the air accommodating chamber **330** is disposed with respect to the liquid accommodating chamber **340**, among wall surfaces partitioning and forming the liquid accommodating chamber **340**. In the injection position of the ink tank **30** when injecting ink from the liquid injection port **304** into the liquid accommodating chamber **340**, the right side face fc becomes a top face. That is, in the injection position, the air accommodating chamber **330** is located above the liquid accommodating chamber **340**.

Further, in the right side face fc, the first flow path **310** is formed. The first flow path **310** makes air taken from the air introduction port **317** flow to the air accommodating chamber **330** through the port opened to the air **318**. Here, the detailed configuration of the first flow path **310** is described using FIG. **7**.

As shown in FIG. **7**, in the right side face fc, the air introduction port **317**, the communication flow paths **317***a* and **320**, the gas-liquid separation chamber **312**, the communication flow paths **319** and **314**, and the port opened to the air **318** are formed. Of these, the communication flow paths **317***a* and **319** are formed in the back face (the inside of the tank main body **32**) of the right side face fc.

The shape of the gas-liquid separation chamber **312** is a concave shape and a communication port **319***a* that is one end portion of the communication flow path **319** is formed in a concave bottom surface. The port opened to the air **318** communicates with the air accommodating chamber **330**, thereby introducing external air into the air accommodating chamber **330**.

A bank **313** is formed at the entire periphery of an inner wall surrounding the bottom surface of the gas-liquid separation chamber **312**. The sheet member **316** (FIG. **6**) is adhered to the bank **313**. The sheet member **316** has a gas permeable and liquid impermeable property. The film **322** (FIG. **6**) is adhered to the right side face fc so as to cover the communication flow path **320**, the gas-liquid separation chamber **312**, the communication flow path **314**, and the communication ports **318**, **319***a*, and **319***b*. In this way, the communication flow paths **314** and **320** are formed and also, leakage of the ink in the ink tank **30** to the outside is prevented.

The air introduction port **317** and the communication flow path **320** communicate with each other through one end portion **320***a* of the communication flow path **320** and the communication flow path **317***a* formed inside the tank main body **32**. The communication flow path **320** and the gas-liquid separation chamber **312** communicate with each other through the other end portion **320***b* of the communication flow path **320**. The communication flow path **320** is formed along the outer periphery of the gas-liquid separation chamber **312** in order to lengthen the distance from the air introduction port **317** to the gas-liquid separation chamber **312**. Accordingly, evaporation of moisture in the ink in the tank main body **32** from the air introduction port **317** to the outside can be suppressed. In addition, from the viewpoint of moisture evaporation suppression, the communication flow path **320** may also be made to be a serpentine flow path in order to lengthen the distance of the communication flow path.

Air that flows to the other end portion **320***b*, the gas-liquid separation chamber **312**, and the communication port **319***a* passes through the sheet member **316** (FIG. **6**) adhered to the bank **313** on the way. The gas-liquid separation chamber **312** and the communication flow path **314** communicate with each other through the communication ports **319***a* and **319***b* and the communication flow path **319** formed in the inside of the tank main body **32**. The communication flow path **314** communicates with the air accommodating chamber **330** through the port opened to the air **318**. As can also be understood from the above explanation, the sheet member **316** (FIG. **6**) divides the port opened to the air **318** from the outside. Accordingly, leakage of ink which is contained in the tank main body **32** to the outside can be suppressed.

As shown in FIG. **8**, the air accommodating chamber **330** has a prismatic shape. In the use position, the outer shape of an uppermost surface **330***h* which is located at the vertically uppermost side, among inner faces partitioning and forming the air accommodating chamber **330**, and the outer shape of a lowermost surface **330***u* which is located at the vertically lowermost side are rectangular. Further, the air accommodating chamber **330** has the upper accommodating chamber **337** of an approximately rectangular parallelepiped shape which includes the uppermost surface **330***h*, the lower accommodating chamber **339** of an approximately rectangular parallelepiped shape which includes the lowermost surface **330***u*, and the communication flow path **338** which makes the upper accommodating chamber **337** and the lower accommodating chamber **339** communicate with each other. The port opened to the air **318** is disposed at a position that is close to the uppermost surface **330***h* and is included in a corner portion of the upper accommodating chamber **337**. In addition, the details of the corner portion will be described later.

In the second flow path **350**, compared to the liquid accommodating chamber **340** or the air accommodating chamber **330**, a length in the depth direction (the Y-axis direction) is small and a length in the height direction (the Z-axis direction) is also small. That is, the second flow path **350** has a flow path cross-sectional area which is small to the extent that a meniscus can be formed. The air-side opening **351** of the second flow path **350** is disposed in the air accommodating chamber **330** and the liquid-side opening **352** is disposed in the liquid accommodating chamber **340**.

The liquid accommodating chamber **340** has a prismatic shape. The liquid accommodating chamber **340** has the liquid holding portion **345** and an air retention portion **340***t*. In the use position, the outer shape of an uppermost surface **340***h* which is located at the vertically uppermost side, among inner faces partitioning and forming the liquid accommodating chamber **340**, and the outer shape of a lowermost surface **330***u* which is located at the vertically lowermost side are rectangular. The air retention portion **340***t* is a portion occupying a higher position than an opening **304***m* on the liquid accommodating chamber **340** side of the liquid injection port **304**, with respect to the vertical direction (the X-axis direction) in the injection position, among the portions of the liquid accommodating chamber **340**. The liquid holding portion **345** is provided in the liquid accommodating chamber **340** in order to maintain the liquid surface of ink at a height equal to or more than a given height in the injection position. The liquid holding portion **345** has the partition wall **342** extending by a given length from a bottom face portion **346** (the left side face fd of the ink tank **30**) in the injection position toward a facing face. The partition wall **342** is formed over the entire area in the Y-axis direction (the depth direction) at the inside of the liquid accommodating chamber **340**. That is, the partition wall **342** divides the bottom face portion **346** into two areas.

A-3. Disposition Relationship Between Respective Configurations of Ink Tank

Next, a positional relationship between the respective configurations of the ink tank **30** will be described in detail. FIGS. **9**A and **9**B are diagrams for describing the disposition positions of the port opened to the air **318** and the air-side opening **351**. FIG. **9**A is a diagram when FIG. **6** is viewed from the Y-axis positive direction side, and FIG. **9**B is a diagram for describing corner portions where the port opened to the air **318** and the air-side opening **351** are disposed. In addition, in FIG. **9**A, in order to facilitate understanding, single hatching is imparted to the upper accommodating chamber **337** and cross-hatching is imparted to the lower accommodating chamber **339**. Further, the boundary of the communication flow path **338** is shown by a dashed line. Further, in FIG. **9**B, the outermost inner wall surface of the air accommodating chamber **330** in a case where the air accommodating chamber **330** is vertically projected vertically downward in the use position is shown by a thick line. Hereinafter, an area surrounded by this thick line is defined to be a vertical projection plane **330***hh* (also referred to as an "outermost frame projection plane **330***hh*"). In addition, in FIG. **9**B, in order to facilitate understanding, the formation positions of the port opened to the air **318** and the air-side opening **351** are schematically shown. In addition, the outermost frame projection plane **330***hh* is defined by a rectangular shape best corresponding with an outer frame shape which is formed by connecting the lines of an outer frame when the inner wall surface of the air accommodating chamber **330** is vertically projected vertically downward. In this example, as shown in FIG. **9**B, the outer frame shape shown by a thick line is a rectangular shape. Further, for example, even if a semicircular projection shape is present along a side **330***h***4** of the outer frame shape shown in FIG. **9**B, the outermost frame projection plane **330***hh* is defined by a rectangular shape best corresponding with an outer frame shape which includes the projection shape.

As shown in FIG. **9**A, with respect to the vertical direction of the tank main body **32** in the use position, the port opened to the air **318** is disposed at a position closer to the uppermost surface **330***h* than an air chamber middle point SM**1** that is the middle point of a line segment S**1** connecting the lowermost surface **330***u* and the uppermost surface **330***h* of the air accommodating chamber **330**. In this example, the port opened to the air **318** is disposed close to the uppermost surface **330***h*. Further, the port opened to the air **318** is formed in the right side face fc that is a face farthest from the liquid accommodating chamber **340** among the inner wall surfaces partitioning the upper accommodating chamber **337**. Further, the port opened to the air **318** is disposed at a corner portion of the air accommodating chamber **330**.

Corner portions are described using FIG. **9**B. Each of sides **330***h***1** to **330***h***4** of the rectangular vertical projection plane **330***hh* is quartered. If the quartered points of the respective sides facing each other are connected to each other, the vertical projection plane **330***hh* is partitioned into 16 equally-divided areas. Among the 16 equally-divided areas, the areas (area with cross-hatching imparted thereto) including corners **330***k***1** to **330***k***4** of the vertical projection plane **330***hh* becomes corner portions **330***s***1** to **330***s***4** of the air accommodating chamber **330**. Here, in this example, the port opened to the air **318** is located in the area of the corner portion **330***s***1** (also referred to as a "first corner portion **330***s***1**"). In this example, the port opened to the air **318** is located at a position closer to the corner **330***k***1** even in the area of the first corner portion **330***s***1**.

As shown in FIG. **9**A, the air-side opening **351** of the second flow path **350** is disposed at a position closer to the lowermost surface **330***u* than the air chamber middle point SM**1** with respect to the vertical direction in the use position. In this example, the air-side opening **351** is disposed at the lowermost surface **330***u*.

Further, as shown in FIG. **9**B, the air-side opening **351** is disposed at the corner portion **330***s***3** (also referred to as a "second corner portion **330***s***3**") that is at a diagonal position to the first corner portion **330***s***1** where the port opened to the air **318** is located.

FIGS. **10**A and **10**B are diagrams for describing the installation position of the liquid-side opening **352**. FIG. **10**A is a diagram when FIG. **6** is viewed from the Y-axis positive direction side. In FIG. **10**B, the outermost inner wall surface of the liquid accommodating chamber **340** in a case where the liquid accommodating chamber **340** is vertically projected vertically downward in the use position is shown by a thick line. Hereinafter, an area plane surrounded by this thick line is defined to be a vertical projection plane **340***hh* (also referred to as an "outermost frame projection plane **340***hh*"). In addition, in order to facilitate understanding, in FIG. **10**B, the liquid-side opening **352** is schematically shown. In addition, the outermost frame projection plane **340***hh* is defined in the same manner as the outermost frame projection plane **330***hh*.

As shown in FIG. **10**A, with respect to the vertical direction of the tank main body **32** in the use position, the liquid-side opening **352** is disposed at a position closer to the lowermost surface **340***u* than a liquid chamber middle point SM**2** that is the middle point of a line segment S**2** connecting the lowermost surface **340***u* and the uppermost surface **340***h* of the liquid accommodating chamber **340**. In this example, the liquid-side opening **352** is disposed slightly above the liquid lead-out portion **306** which is disposed close to the lowermost surface **340***u*, with respect to the vertical direction. Further, the liquid-side opening **352** is disposed close to the film **34** (FIG. **6**) that forms the front face fe among the inner wall surfaces partitioning the liquid accommodating chamber **340**.

Further, as shown in FIG. **10**B, the liquid-side opening **352** is disposed at a corner portion **340***s***3** (also referred to as a "third corner portion **340***s***3**") that is a corner portion of the liquid accommodating chamber **340** and is at a position equivalent to a diagonal position to the corner portion **330***s***1** (FIG. **9**B) of the air accommodating chamber **330**, where the port opened to the air **318** is located. Here, a case where the vertical projection planes **330***hh* and **340***hh* are located in a positional relationship in which with respect to two different rectangular vertical projection planes **330***hh* and **340***hh*, one side becomes parallel to each other is considered. That is, with respect to a positional relationship between the vertical projection planes **330***hh* shown in FIG. **9**B and the vertical projection planes **340***hh* shown in FIG. **10**B, the corner portions **330***s***1** and **340***s***1** which are located at the upper right are equivalent to corner portions corresponding to each other. Further, the corner portions **330***s***2** and **340***s***2** which are located at the lower right are equivalent to corner portions corresponding to each other. Further, the corner portions **330***s***4** and **340***s***4** which are located at the upper left are equivalent to corner portions corresponding to each other. Further, the corner portions **330***s***3** and **340***s***3** which are located at the lower left are equivalent to corner portions corresponding to each other. In addition, the "corner portions of the liquid accommodating chamber **340**" are areas (areas with cross-hatching imparted thereto) including corners **340***k***1** to **340***k***4**, among of the partitioned areas obtained by partitioning the rectangular vertical projection plane **340***hh* into 16 equally-divided areas.

FIGS. **11**A and **11**B are diagrams for describing the installation position of the liquid outlet **349**. FIG. **11**A is a diagram when FIG. **6** is viewed from the Y-axis positive direction side. FIG. **11**B is a diagram in a case where the tank main body **32** shown in FIG. **11**A is made to be in an injection position. In addition, in FIGS. **11**A and **11**B, the disposition position in the liquid accommodating chamber **340** of the liquid outlet **349** that is one end portion of the liquid lead-out portion **306** is also shown collectively.

As shown in FIG. **11**A, with respect to the vertical direction in the use position, the liquid outlet **349** is disposed at a position closer to the lowermost surface **340***u* than the liquid chamber middle point SM**2** that is the middle point of the line segment S2 connecting the lowermost surface **340***u* and the uppermost surface **340***h* of the liquid accommodating chamber **340**. Further, as shown in FIG. **11**B, with respect to the vertical direction in the injection position, the liquid outlet **349** is disposed at a position closer to a lowermost surface **340***u***2** than a second liquid chamber middle point SM**3** that is the middle point of a line segment S**3** connecting the lowermost surface **340***u***2** and an uppermost surface **340***h***2** of the liquid accommodating chamber **340**. In this example, the liquid outlet **349** is disposed close to at least the lowermost surface **340***u* in the use position.

In this manner, with respect to the vertical direction in the use position, the liquid outlet **349** is disposed within a given range, whereby ink can be supplied from the liquid lead-out portion **306** to the sub-tank **20** (FIG. **5**) until the remaining amount of ink in the liquid accommodating chamber **340** becomes smaller. Further, with respect to the vertical direction in the injection position, the liquid outlet **349** is disposed within a given range, whereby even in a case where the injection position is made in state the remaining amount of ink in the liquid accommodating chamber **340** is a smaller amount, it becomes possible to maintain a state where the liquid surface of ink is higher than the liquid outlet **349**. That is, it becomes possible to maintain a state where the liquid outlet **349** contacts with ink without intervention of air. Accordingly, when injecting ink from the liquid injection port **304**, a possibility that air may flow to the recording head **17** side through the liquid outlet **349**, the liquid lead-out portion **306**, and the hose **24** (FIG. **5**) can be reduced.

A-4. Ink Injection Method of Ink Tank

FIG. **12** is a diagram illustrating a state where the remaining amount of ink in the liquid accommodating chamber **340** has become small. In addition, actually, the liquid lead-out portion **306** and the liquid receiving portion **202** of the sub-tank **20** are connected to each other through the hose **24**. However, the illustration is omitted.

As shown in FIG. **12**, if the ink in the liquid accommodating chamber **340** becomes equal to or less than a given amount, in order to prevent generation of a defect (dot omission or the like) of the printer **12**, a user carries out a replenishment of ink. For example, a limit line that becomes the criterion of ink injection timing is applied to the tank main body **32** and in a case where the water level of ink falls below the limit line, a user replenishes ink. Here, it is assumed that the water level of ink falls below the limit line in the state shown in FIG. **12**. When injecting ink into the liquid accommodating chamber **340**, as shown by an arrow YR, the ink tank **30** is rotated such that the liquid injection port **304** faces vertically upward.

FIGS. **13**A and **13**B are diagrams illustrating the state of ink injection into the ink tank **30**. FIG. **13**A is a diagram illustrating the state of the ink in the ink tank **30** when the ink tank **30** has been changed from the use position to the injection position in a state where the remaining amount of ink shown in FIG. **12** is small. FIG. **13**B is a diagram illustrating a state where a normal amount of ink has been injected into the liquid accommodating chamber **340**. In addition, the expression, “injection of a normal amount of ink into the liquid accommodating chamber **340**”, means that ink less than a given amount remains contained in the liquid accommodating chamber **340**. Specifically, it means that ink is injected into the liquid accommodating chamber **340** within the range in which the liquid surface of ink is located below the liquid injection port **304**.

In the case of injecting ink into the liquid accommodating chamber **340**, the plug member **302** mounted on the liquid injection port **304** is removed and ink is then injected from the liquid injection port **304**. Since the liquid injection port **304** is provided in a face parallel to the vertical direction in the use position (FIG. **6**), at the time of ink injection, a user changes a position into the injection position in which the liquid injection port **304** becomes vertically upward. Accordingly, it is possible to prevent ink from being injected into the liquid accommodating chamber **340** in the use position. In a case where ink is injected into the liquid accommodating chamber **340** in the use position, ink is injected in large amounts into the air accommodating chamber **330**. As a result, immediately after ink injection, an ink liquid surface directly contacting with the air is formed in the air accommodating chamber **330**. Accordingly, a water head difference greatly deviated from the stationary time water head difference d**1** shown in FIG. **5** is generated, so that a case where it is not possible to stably supply ink from the ink tank **30** to the printer **12** side occurs.

On the other hand, in this example, in the case of performing ink injection, a user changes the position of the ink tank **30** into the injection position in which the air accommodating chamber **330** is located above the liquid accommodating chamber **340** with respect to the vertical direction. In this way, at the time of ink injection, a possibility that ink may flow into the air accommodating chamber **330** can be reduced, so that it is possible to maintain a water head difference within a given range. In addition, injection of ink is performed in a state where the ink tank **30** and the sub-tank **20** have been connected to each other by the hose **24**. A meniscus (liquid surface bridge) remains formed in the nozzle of the recording head **17** (FIG. **5**), so that a configuration is made such that if an external force (pressure that a piezoelectric element applies to ink) is not applied, ink is not ejected from the nozzle. That is, since the nozzle of the recording head **17** retains ink with a certain force, the ink in the liquid lead-out portion **306** communicating with the nozzle is retained in the liquid lead-out portion **306** without flowing back to the liquid accommodating chamber **340** side.

As shown in FIG. **13**A, in a case where a position is changed from the use position to the injection position in a state where the remaining amount of ink is small, the liquid holding portion **345** suppresses outflow of ink to another portion of the liquid accommodating chamber **340**. That is, the partition wall **342** blocks flow of ink in a direction (the Z-axis positive direction) away from the liquid outlet **349**. For this reason, in the injection position, in the liquid holding portion **345**, it is possible to maintain a higher water level than the other portion. More specifically, by the partition wall **342**, it becomes possible to maintain a water level in the liquid holding portion **345** at a height equal to or more than the height of the liquid outlet **349**. Accordingly, even in a case where the remaining amount of ink is small, the ink in the liquid lead-out portion **306** and the ink in the liquid holding portion **345** can be continuously present without intervention of air. Therefore, a possibility that at the time of the ink injection, air (air bubbles) may flow from the liquid outlet **349** into the liquid lead-out portion **306** and then flow into the sub-tank **20** through the hose **24** can be reduced. In this way, since air is not flowed into the recording head **17** (FIG. **5**) side at the time of the ink injection, it is possible to suppress dot omission due to idle printing, thereby suppressing deterioration of printing quality.

As shown in FIG. **13**B, in a case where a normal amount of ink has been injected into the liquid accommodating chamber **340**, in the injection position, the ink liquid surface in the liquid accommodating chamber **340** is located below the liquid injection port **304**. Here, since in the injection position, a height H**1** of the liquid injection port **304** is lower than a height H2 of the port opened to the air **318**, in a case where a normal amount of ink has been injected into the liquid accommodating chamber **340**, overflow of ink from the port opened to the air **318** can be prevented. Further, even in a case where ink has been excessively injected into the liquid accommodating chamber **340** to the extent that the ink liquid surface reaches the liquid injection port **304**, since the height H**1** of the liquid injection port **304** is lower than the height H**2** of the port opened to the air **318**, overflow of ink from the port opened to the air **318** can be prevented.

Further, with respect to the vertical direction in the injection position, the liquid accommodating chamber **340** has the air retention portion **340***t* that occupies a higher position than the opening **304***m* of the liquid injection port **304** and that retains a given amount of air in the liquid accommodating chamber **340** even in a case where ink has been excessively injected into the liquid accommodating chamber **340** in the injection position. In other words, the liquid accommodating chamber **340** has the air retention portion **340***t* for retaining at least air of a given amount of volume regardless of the injection amount of ink in the injection position. That is, since the liquid accommodating chamber **340** has the air retention portion **340***t* which is located at a position equal to or more than the height of the opening **304***m* in the injection position and in which a periphery other than a vertically downward portion is surrounded by the inner wall surface of the liquid accommodating chamber **340**, air equal to or more than given capacity can be retained in the liquid accommodating chamber **340**. Accordingly, even in a case where the state of the ink tank **30**, which will be described later, has changed, since air equal to or more than a given amount is present in the liquid accommodating chamber **340**, a possibility that the ink in the liquid accommodating chamber **340** may flow out from the port opened to the air **318** toward the outside can be still further reduced.

A-5. Change in State of Ink Tank

Next, the state of the ink in the ink tank **30** in a case where the state of the ink tank has changed will be described using FIGS. **14**A to **16**B. In addition, FIGS. **14**A to **16**B illustrate by dots the state of ink when the state of the ink tank **30** has changed due to transportation or the like in a state where an appropriate amount (for example, an amount shown in FIG. **13**B) of ink has been contained in the liquid accommodating chamber **340**. In addition, the plug member **302** is attached to the liquid injection port **304**. Accordingly, leakage of ink from the liquid injection port **304** to the outside is prevented. Further, the other end portion **348** of the liquid lead-out portion **306** is configured such that liquid is not leaked toward the outside. Specifically, the hose **24** is attached to the other end portion **348**, so that the ink tank **30** is connected to the printer **12** (FIG. **1**). A valve is mounted along the hose **24**, so that it is possible to make the valve be in a closed state at the time of transportation or the like. If the valve enters a closed state, the internal flow path of the hose **24** is blocked. Accordingly, in a case where the state of the ink tank has changed due to transportation or the like, flow of ink from the ink tank **30** to the printer **12** side through the hose **24** is prevented.

FIGS. **14**A and **14**B are diagrams for describing the state of ink in the use position. FIG. **14**A shows the state of the ink of the inside of the ink tank **30** in a case where the ink tank **30** is exposed to low temperature environment in the use position. FIG. **14**B shows the state of the ink of the inside of the ink tank **30** in a case where the ink tank **30** is exposed to high temperature environment in the use position. Here, the term, low temperature environment, refers to, for example, environment in which the temperature around the ink tank **30** is in the range of −20° C. to 20° C., and the term, high temperature environment, refers to, for example, environment in which the temperature around the ink tank **30** is a higher temperature (20° C. to 60° C.) than the low temperature environment.

As shown in FIG. **14**A, in the low temperature environment, a meniscus remains formed in the second flow path **350**. Here, FIG. **14**A shows a state where after an appropriate amount of ink is injected from the liquid injection port **304** into the liquid accommodating chamber **340** in the injection position, the liquid injection port **304** is sealed by the plug member **302** and the use position is then made. That is, if a position is changed from the injection position to the use position, air in the liquid accommodating chamber **340** expands, so that the liquid accommodating chamber **340** is maintained at negative pressure. On the other hand, the air accommodating chamber **330** communicates with the port opened to the air **318**, thereby being maintained at the atmospheric pressure. Accordingly, when a difference between the pressure of air that is present in the liquid accommodating chamber **340** and the pressure of air that is present in the air accommodating chamber **330** is within a given range, the ink in the liquid accommodating chamber **340** does not flow into the air accommodating chamber **330**, as shown in FIG. **14**A.

As shown in FIG. **14**B, if the environment to which the ink tank **30** is exposed changes from the low temperature environment to the high temperature environment, air in the liquid accommodating chamber **340** expands. Then, the ink in the liquid accommodating chamber **340** is extruded due to expansion of air, so that some of the ink flows into the second flow path **350** and the air accommodating chamber **330**. However, the port opened to the air **318** of this example is disposed close to the uppermost surface **330***h* in the use position of the air accommodating chamber **330**. Therefore, in the use position, in a case where the ink in the liquid accommodating chamber **340** has flowed into the air accommodating chamber **330**, a possibility that the ink may leak (flow out) toward the outside through the port opened to the air **318** can be reduced.

FIGS. **15**A and **15**B are diagrams for describing the state of ink in the injection position. FIG. **15**A shows the state of ink in the ink tank **30** in a case where the ink tank **30** is exposed to low temperature environment in the injection position. FIG. **15**B shows the state of ink in the ink tank **30** in a case where the ink tank **30** is exposed to high temperature environment in the injection position.

As shown in FIG. **15**A, in the low temperature environment, a meniscus remains formed in the second flow path **350**. In the injection position, when a difference between the pressure of air in the liquid accommodating chamber **340** and the pressure of air that is present in the air accommodating chamber **330** is within a given range, the ink in the liquid accommodating chamber **340** does not flow into the air accommodating chamber **330**.

As shown in FIG. **15**B, if the environment to which the ink tank **30** is exposed changes from the low temperature environment to the high temperature environment, air in the liquid accommodating chamber **340** expands. Then, the ink in the liquid accommodating chamber **340** is extruded due to expansion of air, so that some of the ink flows into the second flow path **350** and the air accommodating chamber **330**. However, in the use position, since the port opened to the air **318** of this example is formed in the inner wall surface equivalent to the top face of the air accommodating chamber **330**, in a case where the ink in the liquid accommodating chamber **340** has flowed into the air accommodating chamber **330**, a possibility that the ink may flow out toward the outside through the port opened to the air **318** can be reduced.

FIGS. **16**A and **16**B are diagrams for describing the state of ink in another position. FIG. **16**A shows the state of ink in the ink tank **30** in an upside-down position. FIG. **16**B shows the state of ink in the ink tank **30** in a position in which the liquid injection port **304** is vertically downward (hereinafter also referred to as a "downward position").

As shown in FIG. **16**A, in a case where the ink tank **30** is in the upside-down position in which upper and lower sides are in a reverse relationship to the use position, the liquid-side opening **352** is disposed in the vicinity of the uppermost surface of the liquid accommodating chamber **340** in the upside-down position. Therefore, a possibility that ink may flow into the air accommodating chamber **330** through the liquid-side opening **352** can be reduced. Accordingly, a possibility that ink may flow out toward the outside through the port opened to the air **318** can be reduced.

As shown in FIG. **16**B, in a case where it has become the downward position, the liquid-side opening **352** is disposed in the vicinity of the uppermost surface of the liquid accommodating chamber **340** in the downward position. Therefore, a possibility that ink may flow into the air accommodating chamber through the liquid-side opening **352** can be reduced. Accordingly, a possibility that ink may be leaked to the outside through the port opened to the air **318** can be reduced.

FIGS. **17**A and **17**B are a second diagram for describing the state of ink in another position. FIG. **17**A is a diagram schematically illustrating the ink tank **30** in a position in which the film **34** (FIG. **6**) becomes a bottom face (hereinafter also referred to as a "film bottom position"). FIG. **17**B is a diagram schematically illustrating the ink tank **30** in a position in which the film **34** (FIG. **6**) becomes a top face (hereinafter also referred to as a "film top position").

As shown in FIG. **17**A, in a case where the ink tank **30** is in the film bottom position, the air-side opening **351** and the liquid-side opening **352** are disposed at the bottom. For this reason, there is a case where due to a change (for example, a change from a low temperature environment to a high temperature environment) in the environment to which the ink tank **30** is exposed, the ink in the liquid accommodating chamber **340** flows into the air accommodating chamber **330**. However, since the port opened to the air **318** is disposed in the vicinity of the uppermost surface in the film bottom position, a possibility that ink may flow out to the outside through the port opened to the air **318** can be reduced.

As shown in FIG. **17**B, in a case where the ink tank **30** is in the film top position, since the air-side opening **351** and the liquid-side opening **352** are disposed at the top, a possibility that the ink in the liquid accommodating chamber **340** may flow into the air accommodating chamber **330** can be reduced. Accordingly, a possibility that ink may flow out to the outside through the port opened to the air **318** can be reduced.

In this manner, in the ink tank **30** of the first example, since the port opened to the air **318**, the air-side opening **351**, and the liquid-side opening **352** are disposed in the predetermined position range (FIGS. **9**A to **11**B), even if a change in the state of the ink tank **30** (for example, a change in position of the ink tank or a change in environment to which the ink tank is exposed or the like) occurs, a possibility that ink may flow out from the port opened to the air **318** toward the outside can be reduced. Accordingly, a possibility that the sheet member **316** may be wet with ink can be reduced, so that a functional decline of the sheet member **316** can be suppressed. Further, since the liquid accommodating chamber **340** has the air retention portion **340***t*, in a case where the state of the ink tank **30** has changed, a possibility that the ink in the liquid accommodating chamber **340** may flow out from the port opened to the air **318** toward the outside can be still further reduced.

Further, the liquid injection port **304** is provided at the wall surface fc (the right side face fc) on the side where the air accommodating chamber **330** is disposed with respect to the liquid accommodating chamber **340**, among the wall surfaces partitioning and forming the liquid accommodating chamber **340**. That is, the liquid injection port **304** is provided at a face (the left side face fc) parallel to the vertical direction in the use position. Accordingly, when a user replenishes ink to the ink tank **30**, it is possible to urge the user to change the position of the ink tank from the use position to the injection position. Further, since in the injection position, the air accommodating chamber **330** is located above the liquid accommodating chamber **340**, a possibility that ink may flow into the air accommodating chamber **330** at the time of ink injection can be reduced. Accordingly, in the use position, it is possible to make a water head difference, which is generated by a difference in height between the head **17** and the ink liquid surface contacting with air in the ink tank **30**, be within a given range. Therefore, it is possible to stably supply ink from the ink tank **30** to the printer **12**.

Further, in the ink tank **30**, the air accommodating chamber **330**, the liquid accommodating chamber **340**, or the second flow path **350** is formed by the tank main body **32** having a concave shape and the film **34** which seals the opening of the tank main body (FIG. **6**). Accordingly, it is possible to easily form the respective rooms **330**, **340**, and **350** having a complicated shape.

B. SECOND EXAMPLE

FIG. **18** is an exploded perspective view of an ink tank **30***a* of the second example. FIG. **19** is a perspective view of a tank main body **32***a* of the second example. This example is different from the first example in that one ink tank **30***a* is provided with two flow paths opened to the air **300** and two liquid accommodating chambers **340** (FIG. **4**). In addition, with respect to the same configuration as that in the first example, the same reference numeral is applied and explanation is omitted. Further, a positional relationship between the liquid injection port **304**, the air-side opening **351**, the liquid-side opening **352**, and the port opened to the air **318**, which the ink tank **30***a* of the second example includes, is the same as the positional relationship (FIGS. **9**A to **11**B, **13**A, and **13**B) in the first example.

As shown in FIG. **18**, the ink tank **30***a* includes the tank main body **32***a*, two films **34**, two sheet members **316**, the film **322**, two plug members **302**, and cover members **42** and **44**. In addition, a communication flow path **320***p* of the second example is made to be a serpentine flow path unlike the first example. Further, one film **322***a* is provided so as to cover two communication flow paths **320***p* and two gas-liquid separation chambers **312**.

The tank main body **32***a* is molded by synthetic resin such as polypropylene. Further, the tank main body **32***a* is translucent, so that the amount of ink in the inside can be confirmed from the outside. The faces on the Y-axis positive direction side and the Y-axis negative direction side of the tank main body **32***a* are opened and each of the openings is sealed by the film **34**. The cover members **42** and **44** are molded by synthetic resin such as polypropylene or polystyrene. The cover members **42** and **44** are attached to the tank main body **32***a* so as to cover the films **34**, thereby protecting the films **34** from external impact or the like. Further, as shown in FIG. **19**, the tank main body **32***a* has in the inside thereof a partition wall **384** that divides the internal space of the tank main body **32***a* into two. In addition, in order to facilitate understanding, single hatching is imparted to the partition wall **384**.

As can be understood from the above explanation, it can also be said that the ink tank **30***a* of the second example has a configuration in which the rear faces ff (also referred to as the "facing wall surface portions ff") of the two tank main bodies **32** each having the configuration of the first example are constituted by a single common member **384** (the partition wall **384**) and also the two tank main bodies **32** of the first example are integrally molded.

In this manner, the ink tank **30***a* of the second example can be easily formed by an ink tank in which the two ink tanks **30** of the first example are combined. Accordingly, it is possible to improve the production efficiency of the ink tank **30***a*.

C. MODIFIED EXAMPLES

In addition, elements other than the elements described in the independent claims among the constituent elements in the above examples are additional elements and can be appropriately omitted. Further, the invention is not limited to the above examples or embodiments and can be implemented in various forms within the scope that does not depart from the gist thereof, and for example, the following modifications are also possible.

C-1. First Modified Example

In the above examples, the air accommodating chamber **330** is provided with the upper accommodating chamber **337** of a rectangular parallelepiped shape, the lower accommodating chamber **339** of a rectangular parallelepiped shape having volume different from that of the upper accommodating chamber **337**, and the communication flow path **338** making the upper and lower accommodating chambers communicate with each other. However, the shape of the air accommodating chamber **330** is not limited to thereto. That is, it is acceptable if it is a configuration having the given volume capable of retaining ink flowed back from the liquid accommodating chamber **340**. For example, the air accommodating chamber **330** may also be configured only by one chamber of a rectangular parallelepiped shape or may also have a configuration having three or more of accommodating chambers.

C-2. Second Modified Example

In the above examples, the port opened to the air **318** is disposed at a position that is included in the first corner portion **330***s***1** of the two corner portions **330***s***1** and **330***s***2** farthest from the liquid accommodating chamber **340** among the corner portions **330***s***1** to **330***s***4** of the vertical projection plane **330***hh* (FIG. 9B). However, it is not limited thereto. The port opened to the air **318** may also be disposed at a position that is included in any one of the other corner portions **330***s***2** to **330***s***4** of the vertical projection plane **330***hh*. However, the port opened to the air **318** needs to be disposed at a position closer to the uppermost surface **330***h* than the air chamber middle point SM**1** with respect to the vertical direction in the use position. In addition, by disposing the port opened to the air **318** at a position that is included in any one of the corner portions **330***s***1** to **330***s***4**, the disposition positions of the air-side opening **351** and the liquid-side opening **352** are also changed correspondingly. That is, the air-side opening **351** is disposed at the corner portion that is in a diagonal relationship with the corner portion in which the port opened to the air **318** is included with respect to the vertical projection plane **330***hh*. Further, the liquid-side opening **352** is disposed at the corner portion that is at a position equivalent to a diagonal relationship with the corner portion in which the port opened to the air **318** is included with respect to the vertical projection plane **340***hh*. Even in this way, similarly to the above examples, a possibility that ink may flow out from the port opened to the air **318** toward the outside can be reduced even in a case where the state of the ink tank **30** has changed.

C-3. Third Modified Example

In the above examples, each of the ink tanks **30** and **30***a* has the liquid holding portion **345**. However, it needs not have the liquid holding portion **345**. That is, the partition wall **342** needs not be provided in the liquid accommodating chamber **340**. Even in this way, similarly to the above examples, a possibility that ink may flow out from the port opened to the air **318** toward the outside can be reduced.

C-4. Fourth Modified Example

In the above examples and modified examples, the ink tank **30** or **30***a* which is used in the printer **12** as a liquid accommodating container has been described as an example. However, the invention is not limited thereto, but can be applied to a liquid accommodating container capable of supplying liquid to a liquid ejecting apparatus such as an apparatus provided with a head for ejecting a color material of, for example, a liquid crystal display or the like, an apparatus provided with an electrode material (conductive paste) ejecting head which is used for the electrode formation of an organic EL display, a surface-emitting display (FED), or the like, an apparatus provided with a biological organic matter ejecting head which is used for the manufacturing of biochips, an apparatus provided with a sample ejecting head as a precision pipette, a cloth printing apparatus, or a micro-dispenser. Here, in the liquid accommodating container, the liquid injection port that injects liquid and the port opened to the air for introducing air into the liquid accommodating container are separately provided. When using the liquid accommodating container in various liquid ejecting apparatuses described above, it is preferable if liquid (a color material, conductive paste, biological organic matter, or the like) according to the type of liquid that various liquid ejecting apparatuses eject is contained in the liquid accommodating container. Further, the invention can also be applied as a liquid ejecting system which includes each of various liquid ejecting apparatuses and a liquid accommodating container corresponding to each of various liquid ejecting apparatuses.

What is claimed is:

1. A liquid accommodating container for supplying liquid to a liquid ejecting apparatus, comprising:

a liquid accommodating chamber for accommodating the liquid;

a liquid injection port which is for injecting the liquid into the liquid accommodating chamber and on which a plug member that blocks the liquid injection port is detachably mounted;

a flow path opened to the air for introducing external air into the liquid accommodating chamber in accordance with consumption of the liquid in the liquid accommodating chamber; and

a lead-out flow path having one end portion disposed in the liquid accommodating chamber and the other end portion opened toward the outside, thereby making the liquid in the liquid accommodating chamber flow toward the outside,

wherein the flow path opened to the air includes

an air accommodating chamber which has a given volume and is located above the liquid accommodating chamber in an injection position of the liquid accommodating container when injecting the liquid into the liquid accommodating chamber,

a first flow path having one end portion opened in the air accommodating chamber and the other end portion opened toward the outside, thereby making the air accommodating chamber communicate with the outside, and

a second flow path having one end portion opened in the air accommodating chamber and the other end portion opened in the liquid accommodating chamber, thereby making the air accommodating chamber and the liquid accommodating chamber communicate with each other, and capable of holding the liquid by forming a meniscus, and

in a use position of the liquid accommodating container when supplying the liquid to the liquid ejecting apparatus,

a port opened to the air that is one end portion of the first flow path is provided at a position that is closer to an air chamber uppermost surface than an air chamber middle point which is the middle point of a line segment connecting the air chamber uppermost surface and an air chamber lowermost surface of the air accommodating chamber, with respect to the vertical direction, and that is included in a first corner portion which is one of four corner portions of a first rectangular outermost frame projection plane which is a vertical projection plane which is formed when an inner face of the air accommodating chamber is vertically projected vertically downward in the use position,

an air-side opening that is one end portion of the second flow path is provided at a position that is closer to the air chamber lowermost surface than the air chamber middle point and is included in a second corner portion which is at a diagonal position to the first corner portion, among the four corner portions of the outermost frame projection plane, and

a liquid-side opening that is the other end portion of the second flow path is provided at a position satisfying the following conditions (a) and (b),

(a) a position closer to a liquid chamber lowermost surface than a liquid chamber middle point which is the middle point of a line segment connecting a liquid chamber uppermost surface and the liquid chamber lowermost surface of the liquid accommodating chamber, with respect to the vertical direction in the use position, and

(b) a position which is included in a third corner portion that is one of four corner portions of a second rectangular outermost frame projection plane which is a vertical projection plane which is formed when an inner face of the liquid accommodating chamber is vertically projected vertically downward in the use position, and that is at a position equivalent to a diagonal position to the first corner portion in the first rectangular outermost frame projection plane.

2. The liquid accommodating container according to claim **1**, wherein the liquid injection port is provided at an air-side wall surface on the side where the air accommodating chamber is disposed with respect to the liquid accommodating chamber, among wall surfaces partitioning and forming the liquid accommodating chamber, and

in the injection position, the air-side wall surface of the liquid accommodating chamber becomes a top face.

3. The liquid accommodating container according to claim **1**, wherein a liquid outlet that is one end portion of the lead-out flow path is provided in the liquid accommodating chamber so as to be located at a position closer to a lowermost surface than a liquid chamber middle point that is the middle point of a line segment connecting an uppermost surface and the lowermost surface of the liquid accommodating chamber, with respect to the vertical direction in each of the injection position and the use position of the liquid accommodating container.

4. The liquid accommodating container according to claim **1**, wherein the liquid accommodating chamber, the air accommodating chamber, and the second flow path are formed by

a container main body of a concave shape in which one face is opened, and

a film which blocks the opening.

5. The liquid accommodating container according to claim **4**, further comprising: a cover member that is for protecting the film and covers the film.

6. A tank unit comprising:

a plurality of liquid accommodating containers which is the liquid accommodating container according to claim **4** and in which a facing wall surface portion facing the opening has approximately the same shape as the opening,

wherein the plurality of liquid accommodating containers is stacked such that the film of one liquid accommodating container is covered by the facing wall surface portion of another adjacent liquid accommodating container.

7. A tank unit comprising:

two liquid accommodating containers according to claim **4**,

wherein each facing wall surface portion facing each opening of the two liquid accommodating containers is constituted by a single common member, and

the two container main bodies are integrally molded.

8. A liquid ejecting system comprising:

the liquid accommodating container according to claim **1**;

a liquid ejecting apparatus which includes a head for ejecting the liquid onto a target; and

a flow tube that connects the liquid accommodating container and the liquid ejecting apparatus, thereby making the liquid in the liquid accommodating chamber flow to the liquid ejecting apparatus.

9. A liquid ejecting system comprising:

the liquid accommodating container according to claim **2**;

a liquid ejecting apparatus which includes a head for ejecting the liquid onto a target; and

a flow tube that connects the liquid accommodating container and the liquid ejecting apparatus, thereby the liquid in the liquid accommodating chamber flow to the liquid ejecting apparatus.

10. A liquid ejecting system comprising:

the liquid accommodating container according to claim **3**;

a liquid ejecting apparatus which includes a head for ejecting the liquid onto a target; and

a flow tube that connects the liquid accommodating container and the liquid ejecting apparatus, thereby the liquid in the liquid accommodating chamber flow to the liquid ejecting apparatus.

11. A liquid ejecting system comprising:

the liquid accommodating container according to claim **4**;

a liquid ejecting apparatus which includes a head for ejecting the liquid onto a target; and

a flow tube that connects the liquid accommodating container and the liquid ejecting apparatus, thereby the liquid in the liquid accommodating chamber flow to the liquid ejecting apparatus.

12. The liquid ejecting system according to claim 8, wherein the liquid ejecting apparatus is a printer, and the liquid accommodating chamber of the liquid accommodating container accommodates ink.

13. The liquid ejecting system according to claim 9, wherein liquid ejecting apparatus is a printer, and the liquid accommodating chamber of the liquid accommodating container accommodates ink.

14. The liquid ejecting system according to claim 10, wherein liquid ejecting apparatus is a printer, and the liquid accommodating chamber of the liquid accommodating container accommodates ink.

15. The liquid ejecting system according to claim 11, wherein liquid ejecting apparatus is a printer, and the liquid accommodating chamber of the liquid accommodating container accommodates ink.

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